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FOOD TECHNOLOGY ABSTRACTS

Vol. 28 No. 4
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FOOD TECHNOLOGY *ABSTRACTS*

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ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short tim
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro–[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; no less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAG

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

GENERAL

701

Gormley (R). **FLAIR-FLOW EUROPE: A dissemination route to the food industry and consumers.** *Trends in Food Science and Technology* 3(5): 1992: 103-106

This article outlines the background, structure and work of cooperative European community project, the FLAIR-FLOW EUROPE project which aims to disseminate the information about food safety, quality and nutrition to small and medium-sized enterprises within the European food industry and to consumers. GS

702

Blaschek (HP). **Approaches to making the food processing industry more environmentally friendly.** *Trends in Food Science and Technology* 3(5): 1992: 107-110

Microbial and cell-free enzyme systems that bioconvert food processing wastes into value-added products offer the promise of both cost savings and a more environmentally friendly food industry. This review focuses on food based bioconversions using non-toxiogenic clostridia, yeasts and cell-free enzyme systems. 34 references. BV

FOOD PROCESSING

703

Naito (S). **Studies on utilization of ozone in food preservation.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991: 360-367

FOOD PACKAGING

704

Knowles (M). **The impact of legislation on food packaging.** *Food Science and Technology Today* 4(2): 1990: 97-101

705

Penman (A). **The product - package interaction.** *Food Science and Technology Today* 4(2): 1990: 101-105

The developments in the consumer environment which has led to changes in the eating habits: its implication on the food industry: the role of packaging in the total product design: types of packaging techniques are discussed. GS

706

Renshaw (J). **Packaging and the retail trade: Towards 2000.** *Food Science and Technology Today* 4(2): 1990: 105-109

707

Charbonneau (JE). **Application of scanning electron microscopy and x-ray microanalysis to investigate corrosion problems in plain and enamelled three piece welded food cans.** *Food Structure* 10(2): 1991: 171-184

SEM together with X-ray microanalysis, either by itself or in combination with food analytical procedures was found excellent to investigate and diagnose the causes of corrosion in plain and enamelled metal food containers. SD

Packaging materials

708

Shukla (SK) and Misra (AN). **Corrosion inhibition of mild steel in cooling waters by benzotriazole - an anodic polarisation study.** *Research and Industry, India* 37(3): 1992: 175-177

Corrosion inhibition of mild steel by benzotriazole was studied by static method. Water with high hardness, chloride and sulphate used for cooling caused poor inhibition compared to water with low hardness, chloride and sulphate. Higher concn. of benzotriazole (1% and 2%) increased inhibition. GS

Plastics

709

Wille (G). **Plastic films for packaging of foodstuffs - What's new ?.** *Lebensmittelindustrie* 38(3): 1991: 72-73 (De)

FOOD ENGINEERING AND EQUIPMENT

710

Sanjay Jain, Lala (AK), Bhatia (SK) and Kudchadker (AP). **Modelling of hydrolysis controlled anaerobic digestion.** *Journal of Chemical Technology and Biotechnology* 53(7): 1992: 337-344

A mathematical model of anaerobic digestion has been developed which considers the process as occurring through hydrolysis followed by a sequence of steps which have been considered together as a

pseudo-first order process. The Michaelis-Menten equation has been modified to incorporate variable enzyme concn. An immobilized reactor has been designed, fabricated and operated on cowdung feed to obtain data for estimating the model parameters by non-linear regression. These model parameters were used to predict the performance of the reactor and good agreement between experimental and predicted values was observed. The model was further tested satisfactorily on data from the literature. From the parameters estimated it was concluded that hydrolysis was the slowest stage and that the mass transfer of hydrolytic enzyme from microbe to bulk was the rate controlling step in this stage. The hydrolysis reaction, represented by a modified Michaelis-Menten equation, was reduced to first order in bulk enzyme concn. and zero order in substrate concn. thereby emphasizing the significance of bulk enzyme concn. AA

711

Renuad (T), Briery (P), Andrieu (J) and Laurent (M). **Thermal properties of model foods in the frozen state.** *Journal of Food Engineering* 15(2): 1992: 83-97

Thermal diffusivities and thermal conductivities of model food systems were measured by two transient methods: the flash method and the hot wire probe method. Experimental runs were carried out between +20°C and -40°C with binary food gels: water + gelatin; water + ovalbumin; water + starch; water + sucrose. These results were compared with the main thermal conductivity models (series, parallel, Maxwell, series-parallel). The conductivity data which are very sensitive to the ice fraction are best fitted by the Maxwell's model. AA

712

Scott (EP) and Beck (JV). **Estimation of time variable heat transfer coefficients in frozen foods during storage.** *Journal of Food Engineering* 15(2): 1992: 99-121

Many investigators have studied heat transfer coeff. in foods during freezing, but little work has been done on the estimation of surface heat transfer coeff. in frozen foods during storage. This paper investigates a method for the estimation of time varibale surface heat transfer coeff. in frozen foods during storage. This method is unique in that it allows for the estimation of surface heat transfer coeff. as a function of time and in that the procedure incorporates temp. dependent thermal properties. The estimation method is based on the sequential-regularization solution which involves the minimization of a least squares function containing calculated and experimental temp. Certain parameters inherent in this method were first determined using simulated data. Experimental temp. measurements were then obtained using the Karlsruhe Test Substance (Gutschmidt, 1960), a methylcellulose material commonly used in food freezing studies. Estimations of the surface heat transfer coeff. from this data varied with changes in the surface and ambient condition; the estimated values ranged from 6 to 12 $W/m^{2o}C$. AA

713

Al-Duri (B) and McIntyre (S). **Comparison of drying kinetics of foods using a fan-assisted convection oven, a microwave oven and a combined microwave/convection oven.** *Journal of Food Engineering* 15(2): 1992: 139-155

The drying rate curves in terms of moisture content versus time for 5 types of foodstuff have been experimentally obtained using a convection, microwave and combined microwave/convection oven. The foodstuff studied is skimmed milk, whole milk, casein powders, butter and fresh pasta. The effects of changes in temp. and power output have been investigated, respectively. It has been found that the drying rate increases with temp. increase in convection ovens and power outputs in microwave ovens. Furthermore, hi-speed ovens produce the fastest drying rate, yet a microwave oven causes the least damage of food. AA

714

Anon. **Mathematical evaluatiion of food dispersions.** *Journal of Food Engineering* 15(2): 1992: 157-165

This work covers the known methods of evaluation of the size distribution and sedimentation stability of liquid food products containing solid (suspensions) or liquid particles (emulsions). The study introduces an instrumental method of control and calculation of the degree of homogenization and sedimental stability of products. The method is used to estimate the quality of a milk homogenization process. AA

715

Abichandani (H) and Sarma (SC). **Evaporation in a horizontal thin film scraped surface heat exchanger.** *Journal of Food Process Engineering* 14(3): 1991: 173-187

Literature surveys have revealed inadequate information on heat transfer characteristics during evaporation in straight-sided horizontal thin film scraped surface heat exchangers (SSHE). The evaporation of water, concn. of milk and dehydration of cream (30 - 40% total solids) at different rotor speeds, number of blades, flow rates and temp.

differentials were studied in 108 tests with objectives to develop a predictive equation for overall heat transfer coeff. and to study its variation with regard to above parameters in the light of proposed mechanism governing fluid flow, film formation and heat transfer. Data were processed in HCL system-4 computer to fit in quadratic form by method of least squares. Experiments were conducted at higher temp. compared to those encountered in milk evaporators. The information would be useful in designing SSHE for processing several Indian dairy products. AA

716

Palaniappan (S) and Sastry (SK). **Electrical conductivities of selected solid foods during ohmic heating.** *Journal of Food Process Engineering* 14(3): 1991: 221-236

Electrical conductivities of 3 vegetable and two meat samples were determined by subjecting them to a constant voltage power supply in a static ohmic heating device. Conductivities of vegetable samples were increased by soaking them in salt solutions, while soaking in water resulted in reduced conductivity due to leaching of electrolytes. Conductivities under ohmic heating conditions increased linearly with temp. When field strengths were decreased, the conductivity-temp. curve gradually became nonliear, and under conventional heating conditions, a sharp transition was observed. AA

Equipments

Biosensors

717

Kress-Rogers (E). **Biosensor - based instruments for the food industry.** *Food Science and Technology Today* 4(3): 1990: 166-171

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

718

Schirle-Keller (J-P), Chang (HH) and Reineccius (GA). **Interaction of flavour compounds with microparticulated proteins.** *Journal of Food Science* 57(6): 1992: 1448-1451

The vapor pressures of acetaldehyde, diacetyl, ethyl benzene, ethyl caproate, ethyl heptanoate, ethyl sulphide, hexanal, trans-2-hexenal, D-limonene, octanone, 1-pentanol, 2-pentanone, and styrene (50 p.p.m. each) over a vegetable oil emulsion, water or selected fat replacer (aqueous sol., 37°C) was monitored. The 5 fat replacers were a whey-based and an egg based microparticulated protein, a pregelatinized tapioca maltodextrin, microcrystalline cellulose (MCC) and a MCC/carboxymethyl cellulose blend. The flavour compounds interacted with oil in a predictable manner following Raoult's Law. The fat replacers generally had little influence on vapour pressure of the flavour compounds behaving as in a water system except for the Simplesse products which had substantial interaction with aldehydes. AA

719

Macku (C) and Shibamoto (T). **Formation of N-alkylpyrroles in corn oil/amino acid model systems.** *Food Chemistry* 45(1): 1992: 33-36

Volatiles formed by heating corn oil with alanine, cysteine, glycine, phenylalanine, ammonia, methylamine or ethylamine at 180°C for 4 h were analysed by GC and GC/MS. 14 mono- and di-alkyl-pyrroles were identified in the headspace extracts of the corn oil/amino acid mixtures and corn oil/amine mixtures. The formation of 1-alkylpyrroles is proposed as due to the reaction of α-, β-unsaturated fatty aldehydes with the alkylamine produced from the corresponding pyrolyzed amino acid. SD

Chemistry(Analytical)

720

Losada (PP), Mahia (PL), Oderiz (LV), Lozano (JS) and Gandara (JS). **Sensitive and rapid reversed-phase liquid chromatography-fluorescence method for determining bisphenol A diglycidyl ether in aqueous-based food simulants.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 925-928

A method has been developed for detn. of bisphenol A diglycidyl ether (BADGE) in 3 aqueous-based food simulants:water, 15% (v/v) ethanol, and 3% (w/v) acetic acid. BADGE is extracted with C18 cartridges and the extract is conc. under a stream of nitrogen. BADGE is quantitatied by reversed-phase liquid chromatography with fluorescence detection. Relative precision at 200 µg/L was 3.4%, the detection limit of the method was 0.1 µg/L, and recoveries of spiking concn. from 1 to 8 µg/L were nearly 100%. Relative standard deviations for the method ranged from 3.5 to 5.9%, depending on the

identity of the spiked aqueous-based food simulant. AA

721
Aleksandrova (LG), Korolev (AM) and Preobrazhenskaya (MN). **Study of natural ascorbigen and related compounds by HPLC.** *Food Chemistry* 45(1): 1992: 61-69

HPLC revealed that Ascorbigen B (2-epimer of natural ascorbigen) is a mixture of compounds - natural ascorbigen 'dimer' being the major component and its 'trimer' the minor component. To determine the ascorbigen content and its transformation products in extracts of fresh or sour cabbage a reverse-phase chromatographic system with gradient elution was developed with l'-methylascorbigen as an internal standard. Ascorbigen was 2.4 - 5.5 mg/100 g fresh wt., ascorbigen 'dimer' 0.1 - 0.3 mg/100 g fresh wt. and ascorbigen 'trimer' 0.1 - 0.3 mg/100 g fresh wt., 3-hydroxymethylindole 0.2 - 0.3 mg/100 g fresh wt. and (indole-3-yl) acetonitrile 0.1 - 0.5 mg/100 g fresh wt. in extracts of fresh or sour cabbage. SD

FOOD MICROBIOLOGY AND HYGIENE

722
Dodd (C). **Detection of sites of microbial growth in food by cryosectioning and light microscopy.** *Food Science and Technology Today* 4(3): 1990: 180-182

Enzymes

723
Roller (S) and Swinton (S). **Enzymes and the food industry: The role of the Leatherhead Food Research Association.** *Food Science and Technology Today* 4(2): 1990: 111-114

The application of enzymes to the modification of meat texture; for the production of functional food ingredients such as bulking agents, emulsifiers, stabilizers and gelling agents; and for the enzyme immunoassays for the identification of food pathogens are described. GS

724
Lambelet (P), Loliger (J), Saucy (F) and Bracco (U). **Antioxidant properties of coenzyme Q_{10} in food systems.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 581-584

Antioxidant properties of coenzyme Q_{10} (ubiquinone 10, CoQ_{10}) and its reduced form, ubiquinol 10 ($CoQ_{10}H_2$), were determined in foods and the results discussed on the basis of radical exchange reactions occurring between these compounds and lipid radicals. CoQ_{10} does not react with peroxidizing lipids and therefore is not a food antioxidant. Although forming the corresponding semiquinone radical by reaction with peroxidizing lipid, $CoQ_{10}H_2$ is only a poor food antioxidant, as it is rapidly transformed into the corresponding inactive quinone in air. To be active as a food antioxidant, CoQ_{10} must be used in conjunction with a reducing agent such as vitamin C. AA

Microorganisms

725
Chen (HC) and Wu (S-D). **Agar medium for enumeration of fecal coliforms.** *Journal of Food Science* 57(6): 1992: 1454-1457

Spread-inoculated plates of fecal-coliform agar (FCA) were pre-incubated 2 h at 35°C, and then transferred to 44.5°C for 22 h. Fecal coliforms on FCA produce acids and CO_2 which react with bromocresol purple and calcium lactate to form yellow-yellowgreen colonies surrounded by a pale yellow zone. Recovery of control of freeze-stressed *Escherichia coli* on FCA was about 1 log cycle lower than that with nonselective media. The accuracy for FCA to enumerate fecal coliforms from 138 typical colonies of 3 food samples was 98.6%; while the false positive was 1.4%. When the method was compared with the standard 3-tube MPN method for fecal coliforms, counts from 2 methods were not significantly different ($p > 0.05$). AA

726
Kohlmann (KL), Nielsen (SS), Steenson (LR) and Ladisch (MR). **Production of proteases by psychrotrophic microorganisms.** *Journal of Dairy Science* 74(10): 1991: 3275-3283

Six milk-derived psychrotrophic microbial cultures were screened for the ability to grow at refrigerated temp. and produce proteases in reconstituted skim milk. Of these, two cultures, *Pseudomonas fluorescens* M3/6 and *Pseudomonas fragi* K122, produced extracellular protease(s) beginning 7 day postinoculation when the cultures had entered late log or early stationary phases of growth. Further work with these two cultures showed that intracellular proteases were present after only 20 h incubation, before detection of the extracellular proteases. Using H-D-valyl-L-leucyl-L-lysyl-4-nitroanilide (S-2251), a sensitive substrate for plasmin activity, *P. fluorescens* was shown to have greater intracellular proteolytic activity than extracellular activity at 20 h of incubation. The intracellular enzyme activity remained constant

while the extracellular and periplasmic activities increased over the remaining 6 days incubation period. The proteases in crude extracellular extracts from both cultures were characterized and were heat stable with broad temp. (7 to 52°C) and pH (pH 5.5 to 8.5) ranges for activity and were inhibited by the metal chelator, EDTA, indicating that they were metalloproteases. AA

Bacteria

Listeria monocytogenes

727
Harris (LJ), Fleming (HP) and Klaenhammer (TR). **Sensitivity and resistance of *Listeria monocytogenes* ATCC 19115, Scott A, and UAL500 in nisin.** *Journal of Food Protection* 54(11): 1991: 836-840

L. monocytogenes ATCC 19115, Scott A, and UAL500 were evaluated for sensitivity to nisin (0 to 50 µg/ml) using a direct plating method. Nisin (10 µg/ml) decreased an initial population of *L. monocytogenes* (10^9 CFU per ml) by 6- to 7-log cycles. Sensitivity to nisin was enhanced by addition of 2% NaCl or by reduction of the medium pH from 6.5 to 5.5 with either hydrochloric or lactic acid. Mutants resistant to 50 µg/ml nisin were detected at frequencies of 10^{-6} to 10^{-8}. Nisin-resistant *L. monocytogenes* mutants should be expected to arise when nisin is used as an antimicrobial in food systems. AA

Salmonella

728
Wyatt (G), Lee (H) and Morgan (M). **Immunoassays in the food industry - development of a rapid *Salmonella* assay.** *Food Science and Technology Today* 4(3): 1990: 178-180

Fungi

Mushrooms

729
Ajlouni (SO), Beelman (RB), Thompson (DB) and Mau (J-L). **Stipe trimming at harvest increases shelf-life of fresh mushrooms (*Agaricus bisporus*).** *Journal of Food Science* 57(6): 1992: 1361-1363, 1374

Trimming the stipe of cultivated mushrooms, *Agaricus bisporus*, from 35 mm to 5 mm from the cap immediately after harvest resulted in improved shelf-life as indicated by reduced browning and slower cap opening. This effect was evident after 3 days storage at 12°C, and became more pronounced after 6 days. Trimming the stipes had no significant effect on postharvest respiration rate or bacterial growth; thus, the shelf-life improvement was due to other factors. Stipe trimming reduced the wt. (yield) of saleable mushrooms by about 10%; thus, shelf-life improvement would need to offset any economic loss to growers to make this practice commercially feasible. AA

Rhizopus oryzae

730
Banerjee (R), De (KB) and Bhattacharyya (BC). **Optimization of extracellular protease biosynthesis by a newly isolated *Rhizopus oryzae*.** *Indian Journal of Technology* 30(6): 1992: 275-280

Reports the results on the process optimization for protease synthesis by *R. oryzae* (RO, IIT KGP) under acidic and alkaline culture conditions evaluating the effect of metal ions, surfactants, phenolics and fungicides on the synthesis of protease. A remarkable increase in protease synthesis was observed with Ag^+ ion. With other metals enhancement was considerable in alkaline media. Addition of phenolics like catechol, cinnamic acid, salicylic acid in basal medium resulted in some inhibitory effect. Ferulic and tannic acid totally inhibited protease production at higher concn. In the alkaline culture condition with increase in Tween 80 concn. of 0.2%, protease activity increased and protease production was max. at 0.5% concn. of the surfactant in both alkaline and acidic culture condition. A 3.21-fold increase in protease synthesis was observed with 0.05 mg/100 ml silver nitrate in alkaline culture, and a 4.2-fold increase with Tween 80 of 0.05 ml/100 ml. The optimum initial pH and temp. for protease synthesis was 30°C, pH 5 and 37°C, pH 10. It concludes that the organism has the quality to become an industrial strain. SRA

Yeasts

731
Deepa Bhajekar and Kulkarni (PR). **Effect of osmotic shock on osmotolerant yeasts.** *Die Nahrung* 35(8): 1991: 835-839

Shock exposure of osmotolerant yeasts *Debaryomyces hansenii* 3339, *Zygosaccharomyces mellis* 3296 and *Kloeckera antilarrum* 3046 to solutions of sucrose at a_w values between 0.99 and 0.88 was found to cause a great decrease in cell vol. but an increase in heat resistance. For *D. hansenii* the cell vol. decreased from 28 μm^3 to 4 μm^3 and it

could withstand a temp. of 65°C for over 20 min. *Z. mellis* and *K. antilarrum* showed a decrease in cell vol. from 31 μm^3 to 3 μm^3 and 4 μm^3 respectively and both survived a heat treatment of 75°C for over 30 min. AA

Geotrichum candidum

732
Hang (YD) and Woodams (EE). **Purification and characterization of lactate dehydrogenase from *Geotrichum candidum*.** *Food Chemistry* 45(1): 1992: 15-17

The crude extract of *G. candidum* contained an appreciable amount of NAD-independent lactate dehydrogenase activity. The 60-fold purified enzyme catalyzed the oxidation of L-lactate to pyruvate with potassium ferricyanide and 2,6-dichlorophenol indophenol as electron acceptors and could be used as a diagonostic tool for the specific detn. of lactic acid in foods, beverages and other biological materials. SD

Hygiene

733
Bohner (HF) and Bradley (RL). **Corrosivity of chlorine dioxide used as sanitizer in ultrafiltration systems.** *Journal of Dairy Science* 74(10): 1991: 3348-3352

Chlorine dioxide is a very potent sanitizer in UF systems and other applications in which soil residues are frequent. Two sanitizers containing chlorine dioxide as the active ingredient were examined for their potential of corroding stainless steels used in the construction of UF systems. One sanitizer was an acidified solution of dilute sodium chlorite at pH 2.7: the other sanitizer was dilute chlorine dioxide (about 15 p.p.m.) in tap water. Stainless steel types 304 and 316 corroded rapidly when exposed to the acidified chlorite solution. Chlorine dioxide near neutral pH 7.2 was noncorrosive to both type 304 and 316 stainless steels at a concn. of 100 p.p.m. during 10 days of continuous exposure. This concn. is well above the typical use concn. of 15 p.p.m.: typical use time span is 15 min. AA

BIOTECHNOLOGY

734
Kapoor (R) and Mehta (U). **Iron bioavailability from *Spirulina platensis*, whole egg and whole wheat.** *Indian Journal of Experimental Biology* 30(10): 1992: 904-907

Bioavailability of Fe from diets containing $FeSO_4$, *Spirulina* whole wheat (WW) and whole egg (WE) were assessed in male albino rats by haemoglobin (Hb) depletion method. The mean values at the start of depletion for Hb and packed cell vol. (PCV) were 9.42 g/100 ml and 33%, respectively which came down to 6.69 g/100 ml and 28.6% after 21 days of depletion period. At the termination of repletion period the average Hb concn. increased by nearly the same % in *Spirulina* (52), WW (57) and WE (55) diet groups, but Hb increase with $FeSO_4$ diet (75) was higher than *Spirulina*, WW, WE diets. Except in $FeSO_4$ diet, the PCV increased by nearly the same % in *Spirulina* WW, WE fed groups. The absorption of Fe from *Spirulina* (54.62%) was significantly < $FeSO_4$ (68.2%) and WE (65.36%), but significantly > WW (48.54%). SRA

TISSUE CULTURE

Nil

FOOD ADDITIVES

735
Sareen (S). **Food additives - role of Indian standards.** *ISI Bulletin* 6(3): 1992: 71-73

Reviews the standardization work on food additives by the Bureau of Indian Standards and the provision of the Prevention of Food Adulteration Act in containing their misuse. Aspects covered include classification, permitted food additives, standards formulation, certification, international scene and future tasks in the area of food additives. SRA

Preservatives

736
Buazzi (MM) and Marth (EH). **Mechanisms in the inhibition of *Listeria monocytogenes* by potassium sorbate.** *Food Microbiology* 8(3): 1991: 249-256

L. monocytogenes was injured by treating the bacterium with a solution of 1% (w/v) potassium sorbate for 30 min. Injury was shown by inability of the bacterium to tolerate 6% NaCl in tryptose agar (TA) and ability to grow on TA with no added salt. Colony-forming ability of injured cells was restored when they recovered in tryptose broth containing sub-lethal amounts of metabolic or synthetic inhibitors. 2,4-Dinitrophenol was the only inhibitor which effectively prevented recovery of injured cells. No changes occurred in the cell membrane that

allowed soluble proteins or nucleotides to leak from cells during the course of sorbate injury. AA

Stabilizers

Gums

737

Soni (PL), Sharma (S) and Shiva (MP). ***Leucaena leucocephala* (Subabul) tree - a new potential source of gum.** *Research and Industry, India* 37(4): 1992: 223-227

Rheological properties of subabul gum were compared with other commercially important *A. senegal* and *Acacia nilotica* gums. The synergistic action and mode of interaction of xanthan gum with the gums of *L. leucocephala*, *A. senegal* and *A. nilotica* was also reported. GS

Guar gums

738

Khan (WU), Surana (A) and Grover (PD). **Viscosity of carboxymethyl hydroxypropyl guar gum solution as a function of temperature concentration, pH and additives.** *Research and Industry, India* 37(4): 1992: 243-248

CMHPG - a mixture of carboxymethyl (CMG) and hydroxypropyl (HPG) groups into guar gum, had an insoluble residue content of 0.3 - 0.5 wt. % and viscosity of 965 cPs. The decrease in viscosity and insoluble residues content of CMHPG as compared to the hydroxypropylated guar gum was due to the acidic nature of the carboxymethyl group causing cleavage in the guar molecular chain. CMHPG showed compatibility with 2% KCl sol. The viscosity of a fully hydrated CMHPG sol. varied directly with temp. in the range 30 - 95°C. The presence of carboxymethyl group in CMHPG, imparted better solubility than HPG because of its ionic nature. CMHPG sol. were found stable over a wide pH range. At pH below 6.0 the sol. tended to decompose. GS

Sweeteners

739

Nalini Ayya and Lawless (HT). **Quantitative and qualitative evaluation of high-intensity sweeteners and sweetener mixtures.** *Chemical Senses* 17(3): 1992: 245-259

High intensity sweeteners were evaluated for sweetness and bitterness intensity using time-intensity scaling. Mean intensities of 50:50 mixtures as well as the single sweeteners were used to compute predicted scores which were compared to the observed scores as a means of evaluating additivity in the mixtures. Concn.-dependent effects of subadditivity, additivity and hyperadditivity were observed within some sweetener pairs, but these did not follow any consistent pattern across sweeteners. Synergy, a special case of hyperadditivity evaluated by comparing predicted to observed scores, was seen in mixtures of aspartame and acesulfame-K at all concn. Aspartame/saccharin blends were synergistic only at the lowest concn. tested, despite the structural similarity between acesulfame-K and saccharin. Blands of sucrose/aspartame and acesulfame-K/saccharin did not exhibit synergy. Comparisons based on ratings of initial sweetness rather than the whole time-intensity curve, reflected previous findings of synergy in some sweetener pairs. AA

CEREALS

Paddy

740

Rajendra Kumar (K) and Zakiuddin Ali (S). **Properties of rice starch from paddy stored in cold and at room temperature.** *Starch/Starke* 43(5): 1991: 165-168

Brabender viscograms of rice flour from aged paddy (stored at room temp., RT 20 - 33°C for 15 months) of two high amylose fine grain cvs showed higher paste viscosities than that from the paddy stored at 4 - 6°C (cold) for the same period. The differences were almost eliminated in case of isolated starches. The total amylose content was same for the starches from both aged (RT stored and cold stored) paddy. However, the hot water soluble amylose content was less in starches from "aged" paddy. The number average mol. wt. (M_n) as well as the swelling power and solubility of the starches from RT stored (aged) paddy were also less indicating that the aging of rice could partly be associated with the changes in the physicochemical properties of its starch. AA

Rice

741

Sahee (BC) and Das (AK). **Biochemical changes during maturation and development of rice grain (*Oryza sativa*).** *Madras Agricultural Journal* 78(5-8): 1991: 168-170

Four rice cv., ES 1-2-3, CRM 13-3241, CR 237-1 and HPU 741 were analysed for reducing sugar, starch, protein and its different fractions and trace

elements, Fe, Mn and Zn during maturation and development period. Reducing sugar content decreased; starch and protein contents increased during maturation. Changes in Fe was more in ES 1-2-3. HPU 741 showed significant changes in Zn. CR 237-1 and HPU 741 were susceptible to changes in Mn. GS

742

Saraswat (VK) and Bansal (KN). **Methods of zinc application and its effect on yield and zinc content of rice (*Oryza sativa*) and wheat (*Triticum vulgare*).** *Madras Agricultural Journal* 78(5-8): 1991: 174-177

Direct and residual effect of different methods of Zn application on the yield and Zn content of rice and wheat were studied. Applied Zn increased the Zn content and uptake by grain and straw of both rice and wheat. The Zn concn. in control (wheat grain) rose to 42.8 p.p.m. from 27.2 p.p.m. in 1977-78 and to 37.3 p.p.m. from 24.8 p.p.m. in 1978-79. GS

743

Nikkuni (S), Ishiyama (T) and Suzuki (C). **Changes in rice proteins during *miso* fermentation.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991: 316-322 (Ja)

Changes in rice proteins during *miso* fermentation were investigated. The percentages of water-soluble nitrogen content to total nitrogen content (nitrogen solubility) of the steamed rice samples (4 samples) were 0.3 - 0.4%. The nitrogen solubilities of the koji samples prepared with these steamed rice samples were 9 - 14%. When each koji sample was mixed with salt (at finally 12%) and water (at finally 44%) and allowed to ferment at 30°C for 60 days, the nitrogen solubilities were ranged from 35 to 44%. There were not so differences in the SDS-polyacrylamide gel electrophoretic (SDS-PAGE) pattern between the lyophilized soaked rice samples and the water-insoluble fractions of the koji samples. Clear bands with mol. wts. of 22 - 23 KDa and faint bands with mol. wts. of 26, 37, 39 and 57 KDa were observed in the SDS-PAGE patterns of the water-insoluble fraction of the mixture fermented for 60 days. When the koji was mixed with salt, water and cooked soybeans to make miso and the mixture was allowed to ferment at 30°C for 60 days, the nitrogen solubility increased to approx. 60%. The bands with mol. wts. of 5 to 15, 22 - 23 KDa, 26, 37, 39 and 57 KDa were observed in the SDS-PAGE pattern of the water-insoluble fraction of the *miso*. From the above results, it is found that rice proteins, especially of basic subunits of glutelin with mol. wt. of 22 - 23 KDa, are hardly digested by koji enzymes during *miso* fermentation. AA

744

Siscar-Lee (JJH), Juliano (BO), Tsuji (S), Chikubu (S) and Faure (J). **Viscosity and flow properties of cooked milled rice slurries.** *Starch/Starke* 43(6): 1991: 220-225

The applicability of a microcone plate viscometer for measuring some rheological properties of cooked milled rice slurries was studied on milled rices differing in cooked rice texture properties. Viscosity and flow parameters of 10 or 12.5% boiled milled rice slurries were estimated by Power Law Model with a Wells-Broodfield RVTCP microcone plate viscometer with 2.4 cm diam. 1.565° cone at 25°C and compared with data from other methods. Cooking of the sample was critical in obtaining reproducible results. Selected pairs of samples of similar amylose contents differing in cooked-rice texture properties by sensory and instrument methods differed also in Power Law parameters flow behaviour index n and consistency coeff. m. Apparent viscosity at 10 and 20 rpm may be used to index m, but not n. Differences in m and apparent viscosity were not always those predicted by other texture indexes. Alkali spreading value at adjusted KOH concn. may be useful in texture differentiation among rices with similar values in 1.7% KOH. AA

Wheat

745

Fretzdorff (B), Zwingelberg (H) and El Baya (AW). **Studies on wheat germ stabilization.** *Getreide-Mehl und Brot* 45(4): 1991: 99-103 (De)

Wheat starch

746

Zhang (W) and Jackson (DS). **Retrogradation behaviour of wheat starch gels with differing molecular profiles.** *Journal of Food Science* 57(6): 1992: 1428-1432

Differing molecular profiles of starches were developed by acid treatment of native wheat starch. Mol. wt. distribution, branching and linear chain length distribution was characterized. Starches with fewer large size amylopectin fragments, increased smaller size amylopectin fragments, decreased branch points, decreased overall sizes, and narrower linear chain length distributions, had higher initial retrogradation rates. However, all aged starch gels had similar final crystalline enthalpy levels. Different retrogradation behaviours were due to smaller size amylopectin fragments, narrowed linear chain length distribution, and decreased branching. Retrogradation behaviour

was modeled using classical Avrami kinetics to allow comparison with other retrogradation studies. AA

MILLETS

Corn

747

Maga (JA), Kim (CH) and Wolf (CL). **The effect of gellan gum addition on corn grits extrusion.** *Food Hydrocolloids* 5(5): 1991: 435-441

Corn grits with 15 and 25% moisture and added levels of 0, 0.01, 0.1 and 0.5% gellan gum were extruded using 1/1, 3/1 or 5/1 compression screws operating at 100 rpm at dough temp. 100, 150 or 200°C. Gellan addition did not significantly influence yield, density, expansion ratio and breaking strength but water absorption index increased with the gellan gum and significantly reduced the extruder torque. SD

Sorghums

748

Lai (M-N), Chang (F-W) and Wang (H-H). **Application of pseudo-steady heat conduction model for solid state fermentation of sorghum mash.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(3): 1991: 226-234

Sorghum brewing is a Chinese traditional solid state fermentation, which has been carried out in three consecutive cycles in Taiwan. In order to understand the thermal properties of solid mash, the temp. profile of solid mash with water jacketed cylindrical fermentors was measured. The results were analyzed with one dimensional pseudo-steady heat conduction model with neglected heat convection. This model could be used for the estimation of fermentation heat of sorghum mash. In addition, it could be used to predict the optimal diam. of fermentors. Two consecutive fermentation with the cylindrical fermentors illustrates the production of 23.03 kg alcohol from 100 kg of sorghum grains which is generally obtained by 3 consective fermentation in the traditional process. AA

PULSES

749

Bansal (KN). **Effect of levels of sulphur on the yield and composition of soybean (*Glycine max* (L) Merr.), greengram (*Vigna radiatus* L.), blackgram (*Vigna mungo* L.) and cowpea (*Vigna sinensis* L.).** *Madras Agricultural Journal* 78(5-8): 1991: 188-190

Effect of 4 levels of S viz., 0, 20, 40 and 80 kg S/ha in alluvial soils, on soybean, greengram, blackgram and cowpea were studied. Soybean, blackgram and cowpea showed higher yield than greengram. N, S, P and K contents were increased in soybean. GS

African yam beans

750

Njoku (HO), Ofuya (CO) and Ogabulie (JN). **Production of tempeh from the African yam bean (*Sphenostylis stenocarpa* Hams).** *Food Microbiology* 8(3): 1991: 209-214

The suitability of the African yam bean (fermented with *Rhizopus microsporus*) as an alternative tempeh substrate was studied and the acceptability of the product as a filler for meat pie (a popular local snack) was evaluated. The product was organoleptically acceptable and the fermentation caused significant changes in the crude protein and total carbohydrate content of bean seeds. When used as a pie filler, there were significant taste differences between 'yam bean tempeh pie' and that of commercial beef meat pie ($P < 0.05$). Of the different formulations, the pie made with ground yam bean tempeh was most acceptable. The results are important in the utilization of the African yam bean along new lines. SRA

Chickpeas

751

Singh (T) and Tiwari (KN). **Effect of zinc application on yield and nutrient content in chickpea (*Cicer arietinum* L.).** *Madras Agricultural Journal* 79(2): 1992: 87-91

Effect of Zn application (0, 2.2 and 4.4 kg ha^{-1}) in 3 var. of chickpea (K-850, K-468 and T-3) on yield; nutrient content and uptake of Anactinon; and contents of P, Fe, Cu and Mn in grain and straw was studied. Application of Zn significantly increased the yield and content and uptake of Zn, decreased the contents of P, Fe and Cu. The var. differed in yield potential, An content and uptake and content of other nutrients. GS

Cowpeas

752

Tuan (Y-H) and Phillips (RD). **Nutritional quality of hard-to-cook and processed cowpea.** *Journal of Food Science* 57(6): 1992: 1371-1374

Hard-to-cook (HTC) defect was induced in cowpea seeds by storing at 37°C and 85% RH for 6 wk. HTC and control (stored at 7°C, 60% RH) seeds were boiled for 45 and 90 min or ground to flour. Flour was cooked as paste or extruded (20% H_2O, 150°C). Overall dietary quality was estimated as Feed Efficiency and Relative Response Ratio. Protein quality was detemined as Nitrogen Efficiency and Relative Nutritive Value. Overall and protein nutritional quality were generally higher for control than for HTC cowpea diets. Processing affected control and HTC seeds differently. Boiling either control or HTC whole seeds improved both overall and protein quality compared to raw seeds, while extrusion substantially increased the quality of control seeds but reduced the quality of HTC seeds. Cooking as paste improved protein and overall quality of control seeds but not protein quality of HTC seeds. AA

Faba beans

753

Alka Sharma and Salil Seghal. **Protein and starch digestibility of faba bean in dependence on processing and cooking methods.** *Die Nahrung* 35(8): 1991: 891-893

Faba bean var. (VH-131 and WF) showed increased protein and starch digestibility due to soaking and cooking, but autoclaving for 25 min had max. beneficial effect. Sprouting had a remarkable effect on increasing starch digestibility especially in the WF var. BV

French beans

754

Ramesh (GS), Kaushik (V) and Nirankar Nath. **Evaluation of blanching requirements of green French bean (*Phaseolus vulgaris* L.) pods on basis of thermal resistance of its peroxidase.** *Die Nahrung* 35(8): 1991: 817-820

Green pods of French beans CV. Pant Anupam were blended with distilled water, filtered and extract pH was adjusted to 5.25, 5.65, 5.85, 6.25 or 6.65 using 20% citric acid or 1 N NaOH. Thermal inactivation times (TIT) of peroxidase were determined by TIT tube method. The corrected F_{100} [mim] and z [°C] at the above 5 pH values were 1.77 and 15.8, 1.43 and 14.1, 0.95 and 11.0, 0.29 and 8.7 and 0.17 and 8.1 respectively. The corresponding energy of activation values were 157, 177, 218, 286 and 307 KJ $mole^{-1}$. The actual blanching times in boiling media calculated from the above data were 4.0, 3.5, 2.5, 1.0 and 0.5 min, respectively, showing that blanching requirements of French beans decreased with increase in the pH of the blanching media. AA

Kidney beans

755

Roozen (JP) and Jolan de Groot. **Analysis of trypsin inhibitors and lectins in white kidney beans (*Phaseolus vulgaris*, var. Processor) in a combined method.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 940-943

Buffered saline extraction, affinity chromatography, and Folin-BSA protein assay were used consecutively to provide a combined method for analysis of trypsin inhibitors and lectins in white kidney beans (*Phaseolus vulgaris*, var. Processor). The method was tested by following the decrease of both antinutritional factors by germination of the beans for 7 days at 20°C. Repeatability coeff. of variation were 2 - 7.4% for the trypsin inhibitors and 2.2 - 10% for the lectins. After 7 days of germination, trypsin inhibitors and lectins were reduced by 72 and 92%, respectively. AA

OILSEEDS AND NUTS

756

Jain (PP), Suri (RK) and Mathur (KC). **Amino acid composition of deoiled meals from oilseeds of forest origin.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 7-8

The protein content of deoiled meals of *Viburnum coriaceum* and *Wrightia tomentosa* were 25.9 and 35.59% respectively, and it contained almost all the essential amino acids except tryptophan and cystine. Deoiled meals of both the oilseeds are good sources of protein and amino acids. GS

Almonds

757

Senesi (E), Rizzolo (A) and Sarlo (S). **Effect of different packaging conditions on peeled almond stability.** *Italian Journal of Food Science* 3(3): 1991: 209-218

Packaging and storage methods for peeled almonds were studied with the aim of lengthening their

storage potential, thus extending their marketing period. Packaging materials with different gas and light [ermeabilities, atm. inside the package and storage temp. were investigated. The stability of almonds stored up to 18 months was evaluated using physical (colour, texture and a_w), sensory (colour, flavour and acceptance) and chemical analyses. The lipid fraction was evaluated for oxidation and changes in the content of the tocopherols, an endogenous antioxidant. The results indicated that almonds could be held for up to 9 months of storage without a serious loss in quality, whatever the packaging materials. Beyond this time, quality could be maintained only by using packaging material with low oxygen permeability and the use of refrigeration. Utilization of these techniques could significantly alter the almond market whether as a semi-finished product for industrial use or as a product for direct consumption. AA

Coconuts

Coconut protein

758

Rasyid (F), Manullang (M) and Hansen (PMT). **Isolation and characterization of coconut protein.** *Food Hydrocolloids* 6(3): 1992: 301-314

Simple centrifugal means of coconut protein (CP) separation showed higher recovery than cryoprecipitation fractionation which could be modified taking into account the particular amino acid profile to improve the yield. The distinct protein fraction associated with the 'cream' portion could be applied for emulsification of fat. CP does not possess the beany flavour like soy protein and could be used in food formulations after studying its functional properties. SD

Cottonseeds

759

Sanni (AI) and Ogbonna (DN). **The production of owoh - a Nigerian fermented seasoning agent from cotton seed (*Gossypium hirsutum* L.).** *Food Microbiology* 8(3): 1991: 223-229

Groundnuts

760

Singleton (JA) and Pattee (HE). **Maturity of storage affect freeze damage in peanuts.** *Journal of Food Science* 57(6): 1992: 1382-1384, 1411

The effect of maturity on the extent of freeze damage in peanuts (in the shell) was determined and the concn. of anaerobic products during storage was monitored. Peanuts harvested at 6 different dates were artificially freeze damaged for 10 h at -4°C. Conductivity of water extracts from freeze dried peanuts decreased with maturity as did the amount of K found in the leachates. Acetaldehyde and ethanol concn. in peanuts decreased during both maturity and storage. GS

Groundnut pastes

761

Muego-Gnanasekharan (KF) and Ressurrecion (AVA). **Physicochemical and sensory characteristics of peanut paste stored at different temperatures.** *Journal of Food Science* 57(6): 1992: 1385-1389

When peanut paste was stored at 30, 40 and 50°C for up to 1 yr, that held at 30°C for 161 days had minimal deteriorative changes. At 50°C, the primary deterioration was increased browning, oxidized and cardboard flavours, and oil separation. Regression analysis indicated that ratings for chroma, cooked peanut, cardboard, and oxidized flavours were responsible for > 50% of the variation in response. When a detectable oxidized flavour was used as the indicator of storage deterioration, peanut paste had a predicted shelf-life of 152 days at 30°C; 98 days at 40°C; and 96 days at 50°C. AA

Rapeseeds

762

Quinsac (A), Ribaillier (D), Elfakir (C), Lafosse (M) and Dreux (M). **A new approach to the study of glucosinolates by isocratic liquid chromatography. Part I. Rapid determination of desulphated derivatives of rapeseed glucosinolates.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 932-939

Soybeans

763

McNiven (MA), Grimmelt (B), Macleod (JA) and Voldeng (H). **Biochemical characterization of a low trypsin inhibitor soybean.** *Journal of Food Science* 57(6): 1992: 1375-1377, 1407

The biochemical characteristics of low trypsin inhibitor (LTI) soybean and the effects of heat treatment on their characteristics was studied. LTI soybeans required less heating compared to the conventional soybean in order to destroy trypsin inhibitors and chymotrypsin inhibitor activity. Electrophoresis, enzyme activity measurements and gel exclusion chromatography were used to

characterize LTI soybeans. The protein profiles were similar to that of control soybeans. However, the use of LTI soybean improved the economic viability of soybean as animal feed and human protein food supplements. GS

764

Pinto (VEF), Vaamonde (G) and Montani (ML). **Influence of water activity, temperature and incubation time on the accumulation of aflatoxin B_1 in soybeans.** *Food Microbiology* 8(3): 1991: 195-201

The effect of a_w temp. and incubation time on aflatoxin B_1 production by *Aspergillus parasiticus* NRRL 2999 in soybeans was determined in experimental conditions resembling post-harvest environments. Very low quantities of aflatoxin B_1 were detected at 15°C and 0.902 and 0.950. At this temp. and a_w 0.990, competitive Pencillium growth was observed. The minimal a_w for aflatoxin B_1 production in this substrate was near 0.865. At this a_w level, very low quantities were observed at temp. above 20°C. At lower a_w values (0.801 and 0.750) no aflatoxin B_1 was detected at 15, 20, 25, 30 or 37°C. The optimal a_w for aflatoxin accumulation was 0.990, except at 37°C, in which case the optimum value was 0.950. There was a combined temp. and a_w effect, since the limiting a_w, for aflatoxin production depends on the temp. The aflatoxin B_1 accumulation at different incubation times was greatly influenced by a_w and temp. At 20°C and an a_w of 0.950, aflatoxin B_1 increased with incubation time, at 30°C and an a_w of 0.990, toxin concn. decreased as the incubation time increased and at 37°C and an a_w of 0.950, it reached a max. and then decreased. AA

765

Sessa (DJ) and Nelsen (TC). **Chemical inactivation of soybean protease inhibitors.** *Journal of the American Oil Chemist's Society* 68(7): 1991: 463-470

This study aimed to optimize chemical treatments to destroy Kunitz (KTI) and Bowman-Birk (BBI) type protease inhibitors in model systems, and to destroy total trypsin inhibitor activity in soy flour. Time, temp., and reagent concn. were studied and 40 to more than 85% inactivation of KTI and BBI were observed by treatment with 0.6 mM $Na_2S_2O_5$, 10 mM ascorbic acid + 0.8 mM $CuSO_4$ or 20 mM H_2O_2 + 0.8 mM $CuSO_4$ at 65 - 90°C for 0.5 - 1 h. Upon treatment with $Na_2S_2O_5$, KTI and BBI amino acid composition had no significant change. In contrast, AH + CU^{2+} treatment of both KTI and BBI markedly increased aspartic acid + asparagine and glutamic acid + glutamine contents, and significantly decreased histidine, tyrosine and methionine. With soy flour, only $Na_2S_2O_5$ effectively inactivated both protease inhibitors. Steeping soy flour in 50 mM $Na_2S_2O_5$ at 65°C for 1 h inactivated about 98% BBI and 95% KTI. The information conveyed is basic to developing chemical methodology needed to inactivate both KTI and BBI protease inhibitors in soy protein products. AA

766

Che Man (YB), Wei (LS), Nelson (AI) and Yamashita (N). **Effects of soaking soybeans in dilute acids on biologically active components.** *Journal of the American Oil Chemist's Society* 68(7): 1991: 471-473

Lipoxygenase activity was completely eliminated by soaking in 0.3 M HCl at either 23 or 40°C for 8 h. < 50% trypsin inhibitor remained and urease was inactivated to an acceptable level (0.04 ΔpH). BV

Soy products

Soyball

767

Kanchana (S), Neelakantan (S) and Banumathi (P). **Studies on the formulation of high protein snack foods using soybean - 1. Sweet soyball.** *Indian Journal of Nutrition and Dietetics* 27(7): 1990: 213-219

Soyballs, a high protein sweet snack, is prepared with processed soydhal (500 g), jaggery (350 g), malted sorghum rava (100 g), liquid glucose (50 g) and flavouring agents like cardamom (0.5%), menthol (0.1%), dried ginger (0.5%) and vanilla essence (0.6%). Soyballs prepared from soaked, pressure cooked, dried and roasted dhal contained 21 g protein, 9 g fat, 55 g carbohydrate and 385 Kcal energy per 100 g, and had a shelf-life of 90 days. Prolonged soaking and cooking of dhal reduced the nutrient content. GS

Tofu

768

Schaefer (MJ) and Love (J). **Relationships between soybean components and tofu texture.** *Journal of Food Quality* 15(1): 1992: 53-66

Relationship between protein, lipid, phytic acid, Ca, Cu and Fe from soybean, soy milk and tofu were examined. All except lipid in soybean showed significant correlation with the same component in soy milk, but only phytic acid, Cu and Fe showed significant correlation in soybeans and tofu (moist basis). On dry basis soybean and tofu protein showed a significant correlation of r = 0.93. The correlations between soybean phytic acid with tofu Ca, r = 0.90; tofu Ca with hardness, r = tofu Ca with

springiness, r = 0.73 and tofu protein with fraturability, r = 0.75 were significant. Tofu produced from high protein var. Vinton/Vinton 81 was firmer and more springy texture than tofu prepared from Amsoy 71. Phytic acid may bind the Ca coagulant and alter the tofu structure, yield, composition and texture. SD

Soy proteins

769

Genovese (MI) and Lajolo (FM). **Physicochemical properties of isolated soy proteins from normal, broken or damaged seeds.** *Journal of Food Science* 57(6): 1992: 1378-1381, 1411

The influence of seed quality on the yield and physicochemical properties (viscosity, gel-forming ability and emulsion stability) of isolated soy proteins was determined. Broken or damaged seeds affect the quality of products. Soy protein isolates (SPI) from altered seeds showed physicochemical properties less useful than those of normal seeds. SPI from damaged seeds mixed with those of normal seeds altered proportionally their gelation and water retention capacity of the gels. Viscosity or water absorbing capacity of SPIs is useful as indicators to evaluate quality. BV

770

Campbell (NF), Shih (FF) and Marshall (WE). **Enzymatic phosphorylation of soy protein isolate for improved functional properties.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 403-406

A commercial soy protein isolate (SPI) was phosphorylated using the catalytic subunit of a commercially available protein kinase from bovine cardiac muscle. On the basis of scintillation counting and autoradiography, incorporation of $^{32}P/_i$ into SPI increased with increased incubation time and reached a level of 13 µmol of phosphorus incorporated/g of protein after a 4 h incubation at 37°C. SDS-PAGE and autoradiography of timed protein kinase assays showed $32^P{}_i$ initially incorporated into glycinin acidic polypeptides and then into glycinin basic polypeptides. Very little $32^P{}_i$ was associated with the β, α/α' subunits of β-conglycinin. Compared with nonphosphorylated SPI, the phosphorylated protein showed significantly improved solubility and emulsifying activity over a pH range of 3 - 6. Emulsion stability and foam expansion were also significantly improved with phosphorylation, but foam stability was lower using the phosphorylated protein. AA

Sunflower seeds

771

Udayasoorian (C), Balamurugan (P) and Paramasivam (P). **Effect of N and P enriched sunflower stalk on crop yield, oil content and soil fertility.** *Madras Agricultural Journal* 78(5-8): 1991: 238-240

P_2O_5 enriched sunflower stalk used as an organic manure improved the physical condition and fertility status of soil; and recorded in all the 4 seasons significantly higher oil content over control from 39.3% to 40.0% in inorganic fertilizer treatment. 5% P_2O_5 enriched stalk treatment yielded the max. oil, 535 kg/ha. GS

772

Balamurugan (P), Udayasoorian (C) and Ayyasamy (M). **Effect of magnetic seed treatment on sunflower seed yield and quality.** *Madras Agricultural Journal* 78(5-8): 1991: 294-295

Magnetic seed treatment did not significantly influence flowering, plant height, seed recovery wt. and oil content of sunflower (*Helianthus annus* L.) in both the kharif and rabi seasons. Seeds treated with 5000 gauss recorded the highest seed yield, 1348 kg/ha in kharif and 1253 kg/ha in rabi seasons. GS

773

Chang (KC) and Miyamoto (A). **Gelling characteristics of pectin from sunflower head residues.** *Journal of Food Science* 57(6): 1992: 1435-1439

The textural properties of sunflower pectin (SP) using the standard sag method and the Instron textural profile method, under the near neutral pHs, were investigated and the gelling properties were compared with 2 types of commercial citrus low-methoxyl pectin (LMP). SP formed firm jellies in formulations with 0.60% sugar content with a wide range of $CaCl_2$ (30 to 90 mg/g pectin) and sugar at pH 5.4 and 6.0. Strong interactions among the factors of pH, sucrose and Ca existed for all the three sources of pectin. The texture profile of SP was similar to that of the commercial citrus LMP and had a gel power of 110 compared to 100 and 120 for the other two sources. Sunflower pectin was found more useful in producing low-caloric foods due to its ability to form jellies at near-neutral pHs at low sugar concn. with neutral taste than the acidity and high sugar content required for the high methoxyl pectin to gel. GS

774

Miyamoto (A) and Chang (KC). **Extraction and physicochemical characterization of pectin from**

sunflower head residues. *Journal of Food Science* 57(6): 1992: 1439-1443

Sunflower head residues were treated with 0.75% sodium hexametaphosphate followed by acid precipitation for extraction of pectin; the yield of pectin was 7.3% of the head residues. The extracted pectin contained anhydrogalacturonic acid (89.2%), acetyl ester (2%), and neutral sugars (4.2%), mainly rhamnose and glucose). The degree of methylation was 38.5%. The pectin had a high viscosity (527 cp at 1% level) at pH 3, a high water-holding capacity (57 g water/g organic matter) and a high molecular size than commercial low-methyoxyl-pectin. Sunflower head pectin has a high potential for commercial food applications. BV

TUBERS AND VEGETABLES

Cassava

775

Jaleel (SA), Srikanta (S), Ghildyal (NP) and Lonsane (BK), **Comparative efficiency of techniques for recovery of ethanol from pulpy substrate fermented in solid phase.** *Starch/Starke* 43(5): 1991: 183-186

The recovery of ethanol from fermented pulp of tapioca fibrous residues by hydraulic pressing in 3 stages with interstage water addition lead to 79.68% relative recovery but the concn. of the ethanol in the pooled extract was nearly 60.53% of that present in the fermented pulp. The lower concn. of ethanol in extract obtained by percolation technique and poor extraction efficiency associated with other recovery processes are unacceptable from economic point of view. AA

Sugarbeet

776

Vijay Kumar and Zutshi (K). **Effect of different levels of nitrogen on the yield, nutrient uptake and quality components in juice of sugarbeet (*Beta vulgaris* L.).** *Madras Agricultural Journal* 78(5-8): 1991: 165-167

Application of N at 120 kg/ha increased the root and top yield, sugar yield and uptake of N by sugarbeet. Impurities, alpha amino-N and molassegenic compounds like Na and K in beet juice increased but sucrose content reduced with increasing dose of N. GS

Potatoes

777

Anzaldua-Morales, Bourne (MC) and Shomer (I). **Cultivar, specific gravity and location in tuber affect puncture force of raw potatoes.** *Journal of Food Science* 57(6): 1992: 1353-1356

Three potato cvs were sorted into sp. gr. groups. Slices of raw potato were subjected to a puncture test at 6 sites in the cortex tissue and 8 sites in the pith tissue. The cortex tissue generally showed 25 - 65% higher puncture force than the pith tissue. With exception of pith tissue in Monona cv, puncture force increased with increasing sp. gr. in cortex and pith for raw potato. Dry matter content increased with increasing sp. gr. The cortex tissue had 3 - 6% higher dry matter than pith tissue. AA

778

Mondy (NL), Seetharaman (K) and Munshi (CB). **Irradiation and packaging affect the nitrate-nitrogen concentrations of potatoes.** *Journal of Food Science* 57(6): 1992: 1357-1358

Russet Burbank and Kennebec potato cvs were irradiated with dosages of 0.1 and 1.0 KGy and stored in polyethylene or paper bags for 1 or 3 months at 5°C or 20°C. Tubers receiving irradiation showed a significant ($p < 0.01$) increase in nitrate-nitrogen concn. as compared to controls. Those receiving the 1.0 KGy dose had the highest nitrate-nitrogen concn. Tubers stored in polyethylene bags were significantly ($p < 0.01$) higher in nitrate-nitrogen concn. than those stored in paper bags. Tubers stored at 20°C were significantly ($p < 0.01$) higher in nitrate-nitrogen than those stored at 5°C. These trends were consistent for both cvs. The cortex region was significantly ($p < 0.01$) higher in nitrate-nitrogen concn. than the pith region. Kennebec tubers were significantly ($p < 0.01$) higher in nitrate-nitrogen than the Russet Burbank tubers for all irradiation doses and storage temp. AA

779

Pinthus (EJ), Weinberg (P) and Saguy (IS). **Gel strength in restructured potato products affects oil uptake during deep-fat frying.** *Journal of Food Science* 57(6): 1992: 1359-1360

A controllable food system consisting of a restructured potato product was employed to study the effect of gel-strength on oil uptake. Water loss and oil uptake were affected markedly by gel-strength. Oil uptake decreased as gel-strength increased. The oil uptake ratio, U_R, (wt. ratio of the oil uptake to the water evaporated during frying) was utilized to assess the effectiveness of reducing oil absorption during frying. This criterion was useful

for comparison of restructured potato products with different initial or final moisture contents. AA

780

Golachowski (A). **The properties of starch obtained from irradiated and at various temperatures stored potato tubers.** *Starch/Starke* 43(5): 1991: 176-179 (De)

Potato tubers were either exposed to γ-irradiation (150 Gy) or not. They were stored at temp. of +4°C, +7°C and +13°C for 6 months. The properties of the starch obtained from the irradiated tubers after storage were different from the starch obtained from the tubers before storage and from the starch obtained from the tubers not exposed to γ-irradiation. Range and trends of changes in starch properties depended on the temp. of storage. AA

Potato starch

781

Janas (P). **Rheological studies on potato starch pastes at low concentrations. Part III: Simplified measurements of absolute characteristics of pasting.** *Starch/Starke* 43(5): 1991: 168-171

Results of measurements of pasting characteristics of starch which are carried out in the rotatory viscometer with co-axial cylinders may be expressed in absolute viscosity units. The measurements can significantly be simplified if the rotor of the construction presented in this paper is applied. The rotor may play the role of a stirrer and the measurement cylinder at the same time. The work conditions (stirring - measurement) may be alternated, without any additional manipulations in the measurement system, only by a change of an angular velocity of the rotor. The rotor of the construction presented here can be also useful in rheology measurements of dispersion which sedimentates. AA

782

Janas (P). **Rheological studies on potato starch pastes at low concentrations. Part IV: Absolute measurements of the rheological properties of starch during gelatinization.** *Starch/Starke* 43(5): 1991: 172-175

The method of absolute measurement of the rheological properties of starch suspensions during gelatinization is presented. It enables to determine the flow curves already in the early stage of the process. The studies were carried out on 1.5% aqueous suspension of potato starch. They have shown that just at the temp. of approx. 15°C above the begining of gelatinization the formed paste starts to behave as a shear-thinning liquid with the yield stress, θ_y. The non-Newtonian effects increase as the temp. increases. Experimental data are satisfactorily described by the modified four-parameter power law: $\theta = \theta_y + \theta_o(\gamma/\gamma_o)^n$. The temp. dependence on n- and θ_y-parameters univocally determine the evolution of rheological properties which are observed on experiment. This evolution is understood as the transformation of Newtonian liquid through a pseudoplastic liquid into a nonlinear viscoplastic one. AA

Sweet potatoes

783

Noda (T), Ohtani (T), Shiina (T) and Nawa (Y). **Semi-continuous hydrolysis of sweet potato raw starch by *Chalara paradoxa* glucoamylase.** *Journal of Food Science* 57(6): 1992: 1348-1352

Effect of preservatives was investigated on semi-continuous digestion of sweet potato raw starch by *Chalara paradoxa* glucoamylase which digests both raw and gelatinized starch. Potassium metabisulphite strongly inhibited raw starch digesting activity (RDA) although gelatinized starch digesting activity was only slightly inhibited. Potassium sorbate, among the preservatives examined, showed the weakest inhibition (below 10%) on RDA. In the presence of potassium sorbate, semi-continuous digestion of sweet potato raw starch in a 20L scale hollow fiber UF membrane pilot reactor proceeded efficiently at 30% (w/v) initial concn. of raw starch at pH 5.0 and 40°C. Glucose production was 5.7 to 6.0 g/h/L. AA

Vegetables

Cucumbers

784

Guillou (AA), Floros (JD) and Cousin (MA). **Calcium chloride and potassium sorbate reduce sodium chloride used during natural cucumber fermentation and storage.** *Journal of Food Science* 57(6): 1992: 1364-1368

Cucumber fermentation characteristics and pickle quality were evaluated in brines containing equilibrium concn. of 0 - 0.4% $CaCl_2$, 0 - 0.4% potassium sorbate and 0 - 10% NaCl. Changes in brine pH and acidity, cucumber texture and colour, coliforms, lactic acid and total bacteria, yeasts and molds were followed over time. Results indicated that cucumber spoilage would eventually take place if NaCl or potassium sorbate were not present in the brine. The presence of $CaCl_2$ helped maintain

cucumber firmness. A synergistic action between NaCl, $CaCl_2$ and potassium sorbate was seen, which allowed good quality pickles to be produced when moderate amounts of all 3 components were present in the brine (5% NaCl, 0.2% $CaCl_2$, 0.2% potassium sorbate). AA

Tomatoes

785

Khachik (F), Goli (MB), Beecher (GR), Holden (J), Lusby (WR), Tenorio (MD), Barrera (MR). **Effect of food preparation on qualitative and quantitative distribution of major carotenoid constituents of tomatoes and several green vegetables.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 390-398

The major carotenoid constituents of extracts from several raw and cooked green vegetables (broccoli, green beans, spinach), red ripe tomatoes, and tomato paste have been identified and quantified by HPLC on a C_{18} reversed-phase column. The predominant carotenoids in raw green vegetables were neoxanthin, violaxanthin, lutein epoxide, lutein, α-carotene, and β-carotene. The carotenoids in tomatoes and tomato paste were lutein, 5,6-dihydroxy-5,6-dihydrolycopene, lycopene 1,2-epoxide, lycopene 5,6-epoxide, lycopene, neurosporene, γ-carotene, ζ-carotene, β-carotene, phytofluene, and phytoene. The effect of various means of cooking on the levels of carotenoids in raw and cooked (microwaved, boiled, steamed, stewed) green vegetables and tomatoes has been extensively studied. It was shown that while the epoxycarotenoids were somewhat sensitive to heat treatment, lutein and hydrocarbon carotenoids such as neurosporene, α- and β-carotene, lycopene, ζ-carotene, phytofluene, and phytoene survived the heat treatments. AA

Tomato paste

786

Sandoval (AJ), Barreiro (JA) and Mendoza (S). **Thermal resistance of *Bacillus coagulans* in double concentrated tomato paste.** *Journal of Food Science* 57(6): 1992: 1369-1370

Thermal resistance was determined on a strain of *B. coagulans* in double conc. tomato paste (a_w = 0.95 at 23°C, pH = 4.0, 30.3°Brix, 70.1% moisture and acidity 1.30 g/100g citric acid). A microsyringe method was used with an inoculum of 1.3×10^4 spores/mL. Values of D_{90}°C/ = 3.5 min and z = 9.5°C were obtained. AA

FRUITS

787

Ali (SL) and Mazumdar (BC). **Studies on pectin content of some fruits and plant parts.** *Science and Culture* 57(10-11): 1991: 256

Pectin content of onion husk, water-chestnut husk, garlic husk, petiole of betelvine, flowers of *Bombax malabarica*, bael pulp and ber pulp were determined. Weighed quantity of representative samples was pulped and boiled for 35 - 40 min with double the quantity of distilled water. The slurry was filtered after cooling to room temp. The filtrate was mixed with 90% alcohol of equal vol., stirred well and maintained at low temp. for an h. The gel p.p.t. was filtered through previously weighed filter paper and the filter paper containing p.p.t. was dried (60 - 65°C) to determine the dry wt. of the pectin precipitated. GS

788

Hubinger (M), Memegalli (FC), Aguerre (RJ) and Suarez (C). **Water vapour adsorption isotherms of guava, mango and pineapple.** *Journal of Food Science* 57(6): 1992: 1405-1407

The sorption isotherms of guava, mango and pineapple for a range of a_w using a hygrometric method, and the effect of temp. on the equilibrium data at 25 and 50°C were determined. Temp. had no effect on the isotherms, in all the 3 fruits. Mango and pineapple showed higher sorption capacity than guava due to sugar contents of the fruits. GS

789

Alvarado (JDD). **Specific heat of dehydrated pulps of fruits.** *Journal of Food Process Engineering* 14(3): 1991: 189-195

Specific heat of dehydrated pulps, which were obtained from 31 different fruits at several moisture contents was determined by the indirect mixing method. Data are reported for each fruit. They confirm the application of linear functions, especially at moisture contents above 50%. An exponential regression equation for calculation of specific heat in the whole range of moisture content was established using all the values. AA

Mandarin oranges

790

Rillo (L), Castaldo (D), Giovane (A), Servillo (L), Balestrieri (C), Quagliuolo (L). **Purification and properties of pectin methylesterase from mandarin orange fruit.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 591-593

Pectin methylesterase has been purified to homogeneity from mandarin orange according to a technique which employs an affinity chromatography step on heparin-Sepharose. The purified enzyme has a mol. wt. of 37000 and consists of a single polypeptide chain. Its K_m toward the citrus pectin is 0.84 mg/mL with a V_{max} of 0.38 µmol of acid produced/min. The enzyme exhibits a pH optimum around 9, and 50% inactivation occurred in 1 min at 62°C. The protein is found to be glycosylated, and its amino acid composition has been reported. AA

Pineapples

791

Umano (K), Hagi (Y), Nakahara (K), Shoji (A) and Shimamoto (T). **Volatile constituents of green and ripened pineapple (*Ananas comosus* [L.] Merr.).** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 599-603

Volatile constituents of green and ripened pineapples were isolated and identified by GC and GC/MS. The numbers of volatiles found were 144 and 127 in green and ripened pineapples, respectively. Among a total of 157 constituents identified, 50 were identified for the first time from pineapple. Esters constituted over 80% of total volatiles from both green and ripened pineapples. The major volatile constituents in green pinapples were ethyl acetate and ethyl 3-(methylthio)propanoate. In ripened pineapples, ethyl acetate and butane-2,3-diol diacetate were the main constituents. Diastereoisomers of butane-2,3-diol diacetate were satisfactorily separated by a GC chiral column. AA

792

Shafiur Rahman (Md) and Lamb (J). **Air drying behaviour of fresh and osmotically dehydrated pineapple.** *Journal of Food Process Engineering* 14(3): 1991: 163-171

Fick's Law of diffusion was used in the analysis of the air drying behaviour of fresh (non-osmosed) and osmosed pineapple. The drying rates of osmosed pineapples were significantly decreased due to the presence of infused solute. The effective diffusion coeff. decreased with increasing solid gain during osmosis. AA

Sweet cherries

793

Mattheis (JP), Buchanan (DA) and Fellman (JK). **Volatile compounds emitted by sweet cherries (*Prunus avium* cv. Bing) during fruit development and ripening.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 471-474

Volatile compounds were collected using headspace sampling from intact sweet cherries. Samples were collected at weekly intervals during fruit development and during a 7-day ripening period following harvest at commercial maturity. Thirty-one compounds of several chemical classes were identified including aldehydes, alcohols, esters, a ketone, a volatile acid, and a terpene. Of the compounds identified, ethanol had the highest concn., but the amounts varied considerably among harvest dates. A number of compounds were detected in all the samples, while stage of development determined the presence of other compounds. Several esters were detected only during the ripening period following harvest at commercial maturity. AA

CONFECTIONERY, STARCH AND SUGAR

794

Bopaiah (BM) and Shantaram (MV). **Influence of season and drying temperature on the quality of cocoa beans.** *Indian Cocoa, Arecanut* 15(2): 1991: 37-39

Quality of cocoa beans (*Theobroma cacoa* L.) in dry and wet seasons and the changes in temp. and pH during fermentation and drying were studied. The dry cocoa beans were analysed for bean acidity (pH), 100 bean wt. (g), moisture content (%) and shell content (1%). Results indicated that 65 plus or minus 5°C is the optimum artificial drying temp. Sun-dried beans were superior having low acidity (5.42 pH) as compared to artificial dried beans (5.04 pH). The wet season beans were smaller in size with higher shell content and lower pH than the he dry season beans. Drying of fermented beans at higher temp. resulted in inferior quality beans. GS

795

Serghat (S), Mathlouthi (M), Hoopman (T) and Birch (G). **Solute-solvent interactions and the sweet taste of small carbohydrates. Part I: Effect of solvent polarity on solution properties.** *Food Chemistry* 45(1): 1992: 25-32

The physicochemical properties of D-glucose, D-fructose and sucrose in ethanol-water binary solvent showed different behaviour from that observed in water, as a pronounced effect of ethanol on water structure, probably because of ethanol's hydrophobic effect. In the binary solvent, D-fructose showed a clear difference from other two sugars. The results are useful to interpret the effect

of solvent polarity on the sweet taste of small carbohydrates. SD

796

Ajay Singh and Padmakar. **Enhanced production of glucose by enzymatic hydrolysis of chemical and irradiation-pretreated cellulosic materials.** *Die Nahrung* 35(8): 1991: 887-889

Hydrolysis of natural cellulosic substrates with improved yields of glucose can be achieved by using combined pretreatment of substrate with sodium chlorite and UV irradiation. BV

Confectionery

797

Cebula (DJ) and Smith (KW). **Differential scanning calorimetry of confectionery fats. Pure triglycerides: Effects of cooling and heating rate variation.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 591-595

Differential scanning calorimetry (DSC) measurements of the crystallization and melting phenomena of pure forms of the 3 principal triglycerides present in cocoa butter and related confectionery fats are presented. The results are used to exhibit the usefulness of the DSC technique for potential application in quality control of these types of material, but also as a warning of the difficulties in interpretation of data. The results also serve as a reference for future use in DSC studies of similar materials. AA

Honeys

798

Huhtanen (CN). **γ-radiation resistance of *Clostridium botulinum* 62A and *Bacillus subtilis* spores in honey.** *Journal of Food Protection* 54(11): 1991: 894-896

Irradiation D values for the natural bacterial flora of 2 samples of raw (bulk) honey were 7.50 and 1.91 kGy; for 2 samples of retail honey the D values were 5.66 and 3.49 kGy. Irradiation D values of *Cl. botulinum* 62A spores inoculated into 3 honey samples and into water were respectively, 8.11, 9.38, 12.77 and 2.07 kGy. Similar D values for *B. subtilis* spores were 3.42, 3.35, 4.00 and 1.43 kGy. The radiation resistance of *Cl. botulinum* and *B. subtilis* spores in honey and in sugar syrups was a function of water content. AA

Starches

799

Gruchala (L) and Pomeranz (Y). **Raw-starch degrading amylase(s) affect enzyme-resistant starch.** *Journal of Food Science* 57(6): 1992: 1433-1434

Enzyme-resistant starch (RS) was degraded, in part, by amylase(s) that act on raw starch. The degradation (solubilization) was accompained by changes in several characteristics (peak temp. and enthalpy) and, probably, by the presence of a lipid-amylose complex. The degradation resulted in a significant reduction in one of the two main continuous peaks of RS around 155°C. AA

800

Asp (N-G) and Bjorck (I). **Resistant starch.** *Trends in Food Science and Technology* 3(5): 1992: 111-114

This review covers the difficulties involved in defining, quantifying and determining the physiological effects of resistant starch. Aspects included are starch association with dietary fibre, nature and sources, fate, analysis and labelling of resistant starch. 35 references. BV

801

Chinnaswamy (R) and Hanna (MA). **Extrusion-grafting starch onto vinylic polymers.** *Starch/Starke* 43(10): 1991: 396-402

This review outlines the rationale behind starch polymer based thermoplastic resin production using reactive extrusion processing techniques as well as characterization of these polymers. 26 references. BV

Sugar

802

Zunft (H-J) and Schulze (J). **Lactose - a potential dietary fibre. On the regulation of its microecological efficiency in the intestinal tract. Part 2. Nutrient effect of lactose.** *Die Nahrung* 35(8): 1991: 867-886 (De)

Sugarcanes

803

Bangar (KS) and Sharma (SR). **Effect of foliar application of micronutrients on growth, yield and quality of sugarcane.** *Indian Sugar* 42(4): 1992: 211-213

Foliar application of commercially produced multimicro nutrient (Pushti, Agromin, multiplex and Micron A), and single micronutrients ($FeSO_4$,

$ZnSO_4$, $MnSO_4$ and $CuSO_4$) were tried in a field exp. on Co 7318 sugarcane cv. in 1989-90 and 1990-91 at Sehora, Madhya Pradesh. The field had clay loam soil, pH 7.4, 0.55% organic carbon, 200 kg/ha available nitrogen, 20 kg/ha available P_2O_5 and 395 kg/ha available K_2O. Pushti and Agromin produced 14.2% and 11.7% higher yield of sugarcane, and improved juice quality. Single micronutrients also proved beneficial for sugarcane productivity. SRA

804

Nasir Ahmed (S), Chinnaswami (KN) and Kumaraswamy (K). **Efficacy of modified forms of urea and methods of application on the yield and quality of sugarcane.** *Indian Sugar* 42(4): 1992: 227-229

Field experiments conducted during 1986-87 and 1987-88 on sandy loam soils at Cuddalore, to optimise the nitrogen level and to evaluate the efficacy of forms of urea like urea super granule, neem cake blended urea and neem oil coated urea and 2 methods of application top dressing on the surface and placement at a depth of 10 - 15 cm, for sugarcane crop, showed that millable cane production at 200 kg N ha^{-1} as urea super granule was significantly higher than 275 kg N ha^{-1} as prilled urea application in both the yr of study. Placement of nitrogenous fertilizers at 10 - 15 cm depth in the soil along the plant rows effective than top dressing on the soil surface. SRA

BAKERY PRODUCTS

805

Nochera (C) and Caldwell (M). **Nutritional evaluation of breadfruit - containing composite flour products.** *Journal of Food Science* 57(6): 1992: 1420-1422, 1451

Composite flours containing wheat, breadfruit flour and soy protein, whey or peanut meal were formulated and incorporated into Western style bread and biscuits. Bread containing 10% breadfruit flour and 5% whey, and biscuits containing 10% breadfruit flour and 5% soy protein were judged most acceptable in flavour, colour, and texture. Breadfruit flour contained 4.4% protein and was lower in sulphur containing amino acids and higher in lysine than wheat flour. Breadfruit containing bread and biscuits had low amino acid scores. The protein efficiency ratio (PER) of the biscuit product, however, was similar to that of the casein control while PER of bread was significantly lower. Results suggest that acceptable products can be made with composite flours containing 10% breadfruit flour. AA

806

Heikes (DL). **Mass spectral identification and gas chromatographic determination of chlorinated bleaching adducts in flour-containing food items.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 489-491

Bakery products and other flour-containing food items from the Food and Drug Administration's Total Diet Program were found to contain a series of unusual halogenated compounds when analyzed by a procedure designed for the GC deten. of chlorophenoxy alkyl acid herbicides as their methyl esters. These compounds were shown to occur in bleached flours and were not present in unbleached flours thus, they were assumed to be flour-bleaching adducts. GC-MS with chemical ionization (ethylene oxide) proved useful for the characterization of chlorinated derivatives of indigenous fatty acids: oleic, (Z)-9-octadecenoic acid, and linoleic, (Z,Z)-9,12-octadecadienoic acid. Thus, 9,10-dichlorooctadecanoic acid, 9,10-dichloro-12-octadecenoic acid, 12,13-dichloro-9-octadecenoic acid, 9,10,12,13-tetrachlorooctadecanoic acid, 9-chloro-10-hydroxyoctadecanoic acid, 10-chloro-9-hydroxyoctadecanoic acid, isomers of chlorohydroxyoctadecenoic acid, and isomers of trichlorohydroxyoctadecanoic acid were identified and determined in several food items (breads, cakes, muffins, cookies, crackers, etc.). The most prominent residue was that of 9,10-dichloro-12-octadecenoic acid. Levels found in chocolate cake, yellow cake, and coffee cake commonly exceeded 20 p.p.m. AA

Bread

807

Collar (C), Mascaros (AF) and de Barber (CB). **Amino acid metabolism by yeasts and lactic acid bacteria during bread dough fermentation.** *Journal of Food Science* 57(6): 1992: 1423-1427

Metabolism of 22 free amino acids (AA) during fermentation (early and later steps) of wheat dough samples started with pure and associated cultures of yeast and lactic acid bacteria, and commercial compressed yeast (CY) were investigated. Unfermented and fermented straight doughs were studied by Reversed-Phase HPLC of their dansyl derivatives. Used as starters were strains of *Saccharomyces cerevisiae*, *Lactobacillus brevis*, *Lact. plantarum* and *Enterococcus faecium*. Statistical data analysis indicated clustering of samples with yeast and samples without yeast (including uninoculated doughs) respectively, based on rate of metabolism of acidic, basic, aliphatic and aromatic AA. Differences in AA metabolism during

the later fermentation step (DF2) categorized bacterial starters into groups according to balance between degree of assimilation (DF2 < 0) and exoproteolytic release (DF2 > 0) of AA. AA

808

Weipert (D). **Uniaxial and biaxial tensile tests with wheat bread doughs. Part 1: Dough preparation for the measurements with the extensograph and alveograph.** *Getreide-Mehl und Brot* 45(4): 1991: 103-108 (De)

809

Luther (G). **Dough characteristic and baking machines.** *Getreide-Mehl und Brot* 45(4): 1991: 108-112 (De)

810

Zanoni (B) and Petronio (M). **Effect of moisture and temperature on the specific heat of bread.** *Italian Journal of Food Science* 3(3): 1991: 239-242

The specific heat of bread crust and crumb (CP_b) was determined by differential calorimetric analysis by varying temp. (v) and moisture (Xw), in the ranges of 25 - 120°C and 0 - 44%, respectively. It was reconstructed by combining the specific heat of water and that of a generic dried component, that were respectively found to be quadratic and linear functions of temp. AA

Cakes

811

Hegazy (NA), Mekawy (AA) and Hassona (HZ). **Influence of different levels of peanut hull flour on physical and sensory evaluation of low calorie cakes.** *Die Nahrung* 35(8): 1991: 821-826

Low calorie cakes were prepared using groundnut (peanut) hull flour (GHF 49% fibre) by replacing wheat flour and subjected to physical and sensory evaluations. Cakes prepared with 30% GHF was less acceptable compared to those prepared with 10 and 20% which were closer to control cakes. Reduced levels of plasma total lipids for rats fed the cakes containing 30% GHF (-6.34%) was noticed compared to those containing 10% or control which showed increasing levels for plasma total lipids (7.14% and 16.9%) respectively). Impaired growth was noticed with decreasing levels of total lipids. The present study indicates that GHF could be useful for preparation of dietetic foods of potential value for those suffering from hyperlipidemia. BV

Cookies

812

Yamamoto (Y), Sogo (N), Iwao (R) and Miyamoto (T). **Antioxidant activity of egg yolk during baking and storage of cookies.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(3): 1991: 184-188 (Ja)

The effects of whole egg, egg albumen or egg yolk on the lipid oxidation of cookies during baking and storage were investigated. Cookies which were prepared with linoleic acid by 40% (wt. % to the wheat flour) were oxidized markedly during cooking and storage at 40°C for 7 days. When whole egg or egg yolk was added by 50% of the wt. of the wheat flour for the preparation of cookies with linoleic acid, the lipid oxidation was suppressed entirely. The cookies containing linoleic acid were also prevented against oxidation during storage by the addition of egg albumen by 50% or whole egg or egg yolk by 25% or more. When cookies were prepared with lard not containing tocopherols by 75%, the lipids were oxidized weakly during baking and storage at 40°C for 10 days. When the cookies containing lard without tocopherols were prepared with the whole egg or egg yolk by 25% or more, the lipid oxidation was suppressed, and the cookies were also prevented against oxidation during the storage by the addition of egg albumen by 50% or whole egg or egg yolk by 25% or more, similar to the case of linoleic acid containing cookies. The cookies which were prepared with commercially available lard by 75% were not oxidized at all during baking, and also prevented against oxidation during storage at 40°C for 4 wks. The slight lipid oxidation of the cookies after 6 wks storage was suppressed entirely by the addition of egg albumen by 50% or the whole egg or egg yolk by 25% or more. AA

Pasta

813

Seiler (W). **Mixing, kneading and pressing of raw material during pasta production.** *Getreide-Mehl und Brot* 45(4): 1991: 117-127 (De)

MILK AND DAIRY PRODUCTS

814

Namasivayam (C) and Ranganathan (K). **Treatment of dairy waste using red mud.** *Research and Industry, India* 37(3): 1992: 165-167

Dairy industries dispose large quantity of water used for washing of cans, equipments and floor. This waste water is effectively treated with a flocculant, red mud to protect the aquatic and soil environment. Red mud removed 77, 71, 65, 73 and 95% of

turbidity, BOD, COD, oil and grease and bacterial count respectively at a dosage of 1304 mg/l of effluent compared to 94, 80, 86 and 93% respectively for alum treatment at a dosage of 476 mg/l of effluent. The red mud produces lower sludge vol. and also it is economical. BV

Milk

815

Elsamma Job, Thomas (EK) and Karayalar (KS). **Economics of milk production in homesteads - a case study in Trivandrum district.** *Madras Agricultural Journal* 79(1): 1992: 24-27

Itemwise breakup of costs and returns per cow and buffalo between two calvings revealed that the major cost was feed 94.44% for buffaloes and 93.05% for cows. Annual av. milk yield per animal and cost of production per l were 1217 l, Rs. 5.51 for buffaloes and 1989 l, Rs. 4.09 for cows respectively. GS

816

Nakajima (H), Suzuki (Y), Kaizu (H) and Hirota (T). **Cholesterol lowering activity of ropy fermented milk.** *Journal of Food Science* 57(6): 1992: 1327-1329

The effect of ropy fermented milk on serum cholesterol in rats was studied. Basic diets containing slime-forming *Lactoccus lactis* subsp. *cremoris* SBT 0495, its non slime-forming variant SBT 1275, and acidified reconstituted skim milk, with 0.5% cholesterol added, were fed to F-344 rats for 7 days. Serum cholesterol level of rats fed the ropy fermented milk were the lowest among the three treatments. The serum high-density lipoprotein (HDL) cholesterol/total cholesterol ratio of rats fed ropy fermented milk was the highest. Slime materials produced by *L. lactis* subsp. *cremoris* SBT 0495 had a beneficial effect on rat cholesterol metabolism. AA

817

Troyano (E), Martinez-Castro (I) and Olano (A). **Kinetics of galactose and tagatose formation during heat-treatment of milk.** *Food Chemistry* 45(1): 1992: 41-43

Milk was heated at 115 - 135°C. A first order kinetic model was satisfactorily used to describe the formation of the carbohydrates. From the Arrhenius plot, the activation energies were 113 kJ.mol for galactose and 115 kJ/mol for tagatose whose formation took place only under sterilization conditions and whose presence in commercial milk indicated the severity of the heat-treatment. SD

818

Patel (JR), Dave (JM), Dave (RI) and Sannabhadti (SS). **Effect of feeding milk fermented with mixed culture of human strains of lactobacilli on faecal lactobacilli and coliform counts in human test subjects.** *Indian Journal of Dairy Science* 45(7): 1992: 379-382

819

Coulibaly (K) and Jeon (IJ). **Solid-phase extraction of less volatile flavour compounds from ultrahigh-temperature processed milk.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 612-616

A rapid and sensitive, solid-phase extraction method was developed to isolate relatively nonvolatile flavour compounds from ultrahigh-temp. (UHT) milk. Various solid-phase materials were investigated including activated carbons, C_{18} reversed-phase silica, Florisil, and silica gel. The solid-phase materials packed in small columns (5-mL glass syringes) were treated with various solvents and loaded with the milk samples. Then, the compounds retained in the columns were eluted with methylene chloride and analyzed by GC or GC-MS. Results indicated that the combination of activated carbon and C_{18} reversed-phase silica was the most effective in isolating relatively nonvolatile flavour compounds from UHT milk. Recoveries of the lactones added to milk were as low as 30 p.p.b., and reproducibility of the method appeared to be acceptable according to the coeff. of variation. AA

820

Nieuwenhuijse (JA), Sjollema (A), van Boekel (MAJS), van Vliet (T) and Walstra (P). **The heat stability of concentrated skim milk.** *Netherlands Milk and Dairy Journal* 45(3): 1991: 193-224

Milk powders

821

van Mill (PJJM) and Jans (JA). **Storage stability of whole milk powder: Effects of process and storage conditions on product properties.** *Netherlands Milk and Dairy Journal* 54(3): 1991: 145-167

822

Baldwin (AJ) and Ackland (JD). **Effect of preheat treatment and storage on the properties of whole milk powder. Changes in physical and chemical properties.** *Netherlands Milk and Dairy Journal* 45(3): 1991: 169-181

Whole milk powders (WMPs) were manufactured with different preheat treatments, the experiment

being replicated during the dairying season. The effects during storage were evaluated. There was a very small effect of preheat treatment on moisture content. Sulphydryl (SH) groups and hydroxymethylfurfural (HMF) were affected by both preheat temp. and preheat holding time. In contrast, the solubility index (SI) was significantly affected by preheat holding time only. Thus detrimental effects on SI can be mitigated by using a high temp. short time treatment. During the storage trial of 12 months' duration, moisture content showed a small increase, HMF increase by a factor of 3 (approx.) and SH groups exhibited a small decrease. The SI increased, and the increase was greater for powders with high initial values arising from a high preheat treatment. The relationships between the chemical species measured, particularly SH and HMF, and the rate of development of oxidized aroma and flavour are discussed. The intensity of heat treatment given in the manufacturing process can be guaged using the whey protein nitrogen index test. When WMP is stored in air, high preheat treatment can extend the time before oxidized flavour becomes evident. However, the potentially detrimental effects of high preheat treatment must be taken into account. AA

Milk products

823

Katiyar (SK), Bhasin (AK) and Bhatia (AK). **Traditionally processed and preserved milk products of Sikkimese tribes.** *Science and Culture* 57(10-11): 1991; 256-258

Chhurpi - a cheese like product prepared from milk of cow-yak (a cross between male yak and cow), is an important diet for the Sikkimese tribes. Hot milk is curdled and drained and spread over a tray or filled in a jute bag and kept under heavy wt. to squeeze out residual water. The hard mass obtained is sliced into cubes, sun dried and chewed like betel nuts. Chhurpi processing, preservation techniques, composition and nutritive value are given. The product is a rich source of protein (53.4 - 57.6%), fat (11.2 - 12.3%) and carbohydrate (20.4 - 23.2%) and is highly nourishing. GS

Cheese

824

Zottola (EA) and Smith (LB). **Pathogens in cheese.** *Food Microbiology* 8(3): 1991; 171-182

This paper reviews the recent literature with respect to the occurrence of pathogens in cheeses produced commercially and in some instances in the home. Aspects covered are the history of survillance, establishment of standards, sources of pathogens contaminating milk used for cheesemaking, number of outbreaks, types of cheese involved, and microorganisms implicated. 45 references. SRA

825

Kim Ha (J) and Lindsay (RC). **Contributions of cow, sheep, and goat milks to characterizing branched-chain fatty acid and phenolic flavours in varietal cheeses.** *Journal of Dairy Science* 74(10): 1991; 3267-3274

Selected goat milk (fresh, semi-soft), sheep milk (Pyrenees, Roquefort), and cow milk (Blue, Cheddar) cheeses were analyzed for FFA using a sensitive GC technique. Qualitative profiles for most FFA were similar in the samples, except that 4-ethyloctanoic acid was not found in cow milk cheese. Milk fat of cows contained low concn. of 4-methyloctanoic acid, but milk fat of sheep and goat contained significant amounts of both 4-methyloctanoic and 4-ethyloctanoic acids, which contributed mutton-like and goat-like flavours, respectively. Pyrenees sheep milk cheese contained significant amounts of methyl- and ethyl-substituted phenols, which contributed characterizing sheep-like flavour notes to this cheese variety. AA

826

Iametti (S), Negri (E), Bonomi (F) and Giangiacomo (R). **A spectrofluorimetric approach to the estimation of changes in protein surface hydrophobicity during cheese ripening.** *Netherlands Milk and Dairy Journal* 45(3): 1991; 183-191

A method was devised to investigate protein surface hydrophobicity in the course of ripening of the Italian soft cheese, Taleggio. The method relies on mild homogenization of cheese and on the spectrofluorimetric titration of surface hydrophobic sites on the proteins in the dispersed cheese samples with the fluorescent hydrophobic probe, 1,8-anilinonaphthalenesulphonate. Results of these titration can be expressed in terms of affinity and of the number of sites available to the fluorescent probe on the surface of accessible proteins. Figures obtained from such titrations during the course of cheese ripening were compared with proteolytic indices, derived both from soluble nitrogen measurements and from SDS-PAGE patterns. No direct relationship was found between the extent of ripening, as determined by an analytical measurements, and the events detected by the spectroscopic method. As a control, cheeses were also made under conditions leading to limited proteolysis, i.e. by using a low-activity bacterial inoculum and by increasing the height of the moulds. In these conditions, proteolysis and changes in protein surface hydrophobicity were

considerably slowed down. A relationship was found between the surface hydrophobicity of cheese proteins at the beginning of the ripening process and the extent of subsequent ripening of the cheese. AA

Cheddar cheese

827

Subramanian (P), Malik (RK) and Mathur (DK). **Protein breakdown in Cheddar cheese made from buffalo milk. I. Total and soluble nitrogen fractions.** *Indian Journal of Dairy Science* 45(7): 1992; 360-365

The total nitrogen (TN) content in cheese was not significantly affected by the type of milk or the starter culture used. The TN increased from initial 4.12% to 7.13% after 9 months in cow milk cheese and from 4.02% to 7.14% in buffalo milk cheese prepared with LF-40 starter. The corresponding values for the starter culture CH-9 were 4.17 to 7.79 and 4.00% to 7.74%. Buffalo milk Cheddar cheese prepared with either of the two starter had relatively higher levels of TN after 12 months of ripening. The release of soluble nitrogen (SN) as a function of ripening time was on an exponential pattern in cow milk cheese prepared with LF-40 starter, increasing from the initial 0.26% to 3.10% after 12 months. The values of SN in buffalo milk cheese were lower than those in cow milk cheese. The rate and extent of proteolysis in terms of tyrosine released in cow milk cheese was higher than buffalo milk cheese. SRA

828

Subramanian (P), Mathur (DK) and Malik (RK). **Protein breakdown in Cheddar cheese made from buffalo milk. II. Polyacrylamide gel electrophoretic profile.** *Indian Journal of Dairy Science* 45(7): 1992; 366-369

The electrophoretic studies revealed that while the degradation of α-s_1 casein, initiated at 3 months of ripening was complete by 9 months in LF-40 cow milk cheese, a part of it still remained undegraded in LF-40 buffalo milk cheese and CH-9 cow and buffalo milk cheeses even after 12 months of ripening. The breakdown of α-s_1 casein in buffalo Cheddar cheeses started only after 6 months. It was degraded faster than β-casein in all cases with the result that the major part of β-casein still persisted in cheese ripened for 12 months. The electrophoretic bands representing the casein breakdown products were more in cow milk cheese than in buffalo Cheddar cheese. Between the two starters, LF-40 afforded higher degradation products. AA

829

Subramanian (P), Mathur (DK) and Malik (RK). **Protein breakdown in Cheddar cheese made from buffalo milk. III. Separation, isolation and amino acid analysis of peptides.** *Indian Journal of Dairy Science* 45(7): 1992; 370-378

Gel filtration of TCA soluble extracts revealed that the number of peptides was the same initially both in LF-40 and CH-9 cow and buffalo milk Cheddar cheeses. Differences in the peptide patterns were, however, observed in the cheeses prepared from the two types of milk during ripening. But not very significant differences were noticed due to the two starter cultures used. The intensity of the additional peptide peaks, arising from the fragmentation of larger peptides increased with the time of ripening but it was comparatively low in buffalo milk cheeses. No appreciable difference in the number of different amino acids was observed in 2% TCA soluble peptides isolated at different stages of ripening from cow and buffalo milk Cheddar cheeses prepared with the two starter cultures LF-40 and CH-9. AA

830

Stratton (JE), Hutkins (RW) and Taylor (SL). **Histamine production in low-salt Cheddar cheese.** *Journal of Food Protection* 54(11): 1991; 852-855, 867

To assess the potential for histamine production in low-salt Cheddar cheese, pasteurized milk was inoculated with *Lactobacillus buchneri* St2A at levels of 10^2, 10^3 and 10^4 microorganisms per ml of milk. One additional vat was uninoculated and served as a control. Milk was then manufactured into low-salt (0.40%) Cheddar cheese. After 180 days of aging at 7°C, levels of *l. buchneri* St2A had increased approx. 100-fold in the inoculated cheese. Proteolysis, expressed as µmoles free glycine per g cheese, increased from 40 to 150 (trichloroacetic acid soluble) and from 25 to 130 (phosphotungstic acid soluble) during the ripening period. Histamine levels, however, remained low in the inoculated cheeses (< 5 mg/100 g), suggesting that the potential for histamine formation may be minimal in low-salt Cheddar cheese. It was concluded that the relatively low levels of proteolysis and low temp. of storage were primarily responsible for inhibiting histamine production. AA

Mozzarella cheese

831

Farkye (NY), Kiely (LJ), Allshouse (RD) and Kindstedt (PS). **Proteolysis in Mozzarella cheese during refrigerated storage.** *Journal of Dairy Science* 74(5): 1991; 1433-1438

On four occasions, a 2.72-kg (6-lb) rectangular block of commercial Mozzarella cheese was obtained immediately after manufacture and brined (27% NaCl wt/wt, pH 5.3) in the lab. for 4 h at 4°C. After brining, 4 concentric sections (1 = 0 to 1 cm from surface, 2 = 1 to 2 cm, 3 = 2 to 3 cm, and 4 = core) were taken from half the block and analyzed for NaCl, moisture, and proteolysis. The other half was vacuum packaged and aged at 4°C for 14 days prior to sectioning and analysis. Average NaCl concn. in fresh cheese (1 day after manufacture) were highest (2.28 plus or minus 0.28%) in section 1 and decreased sharply to < 0.3% in sections 2, 3 and 4 but became linear after 14 days of aging. Moisture concn. in the fresh cheese (1 day) were lowest in the core (49.06 plus or minus 1.77%) and outermost sections (49.41 plus or minus 2.56%), highest in section 2 (52.22 plus or minus 2.86%), and intermediate in section 3 (50.43 plus or minus 1.95%). However, after 14 days, cheeses did not have a similar pattern of moisture distribution, and no significant differences were found among sections within cheeses. Electrophoretograms of the cheeses showed a breakdown of α_{s1}-casein to $\alpha_{s1\text{-}I}$-peptide, suggesting residual coagulant activity. Also the intensity of the band corresponding to β-casein decreased with concomitant increase in γ-casein bands, suggesting plasmin activity. Other unidentified bands with electrophoretic mobility slower than γ-caseins were noted. Between day 1 and 14 postmanufacture, α_{s1}-casein and β-casein decreased by 26.4 plus or minus 10.1% and 40.2 plus or minus 9.0%. Levels of total N soluble in water increased from 4.07 plus or minus 1.10% in fresh cheese to 9.66 plus or minus 1.61% in 14 day old cheese. AA

Desserts

832

Donhowe (DP), Hartel (RW) and Bradley (RLJr). **Determination of ice crystal size distributions in frozen desserts.** *Journal of Dairy Science* 74(10): 1991: 3334-3344

Formation of the ice crystal size distribution during manufacture of frozen desserts play an important role in determining textural characteristics. A crystal size distribution with a large mean size and wide variation results in a coarse product. A new methodology has been developed to characterize the ice crystal size distribution accurately. An optical microscope was used to produce photomicrographs of ice crystals in frozen products. The microscope was housed in a refrigerated glove box, which provided excellent temp. control and allowed samples to be analyzed at various stages of manufacture. The photomicrographs were analysed using a digitizing board connected to a microcomputer. Several ice cream and ice milk formulations were analyzed to test the methodology. Ice crystal size was inversely related to the total solids of the formulations. Ice crystal size also increased substantially between draw and hardening and during the first 7 wk of storage at -20°C. Further frozen storage did not result in any significant change in crystal size. These results agree with previous data and with theoretical considerations. AA

Ghee

833

Banerjee (D), Patil (MN) and Jaiswal (PK). **Detection of palmolein in ghee.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 53-54

A simple TLC method, involving extraction of unsaponifiable matter, its concn. under vacuum, separation of compounds using argentated silica gel-G plates and its visualization with a spraying agent, is claimed to detect palmolein upto 7.5% in ghee. SD

834

Rama Prasad (C) and Subramaninan (R). **Qualitative and comparative studies of cholesterol oxides in commercial and home-made Indian ghees.** *Food Chemistry* 45(1): 1992: 71-73

Cholestane triol and epoxide were identified in home-made ghee but not in commercial samples. Butter subjected to high temp. resulted in cholesterol converted into high content of cholesterol oxides (CO) in ghee. These CO from home-made ghee might lead to adverse effects and atherosclerosis. SD

835

Yadav (JS) and Srinivasan (RA). **Advances in *ghee* flavour research.** *Indian Journal of Dairy Science* 45(7): 1992: 338-348

The chemical and biotechnological aspects of *ghee* flavour are reviewed. The role of starter microorganisms in imparting *desi ghee* like flavour to cream-based *ghee* due to production of certain flavour constitutents are discussed. Attempts at simulation of *ghee* flavour into butter-oil using microorganisms and formulation of synthetic mixture of *ghee* flavour are also described. 77 references. SRA

Gulab jamun

836

Patel (AA), Patil (GR), Garg (FC) and Rajorhia (GS). **Textural characteristics of market samples of gulab jamun.** *Indian Journal of Dairy Science* 45(7): 1992; 356-359

The market samples of gulab jamun (a popular milk-based sweet) varied in overall texture quality (TQ) and exhibited variation in texture profile (TP) and sensory texture descriptors. Sponginess and juiciness was observed in moderate intensity showing a high TQ, and were found to be the desirable attributes. Crumbliness and gumminess were considered less desirable. Sponginess contributed 76% of the TQ of gulab jamun. Instron hardness and deformation energy were highly correlated with sensory firmness. Notable correlations were observed between instrumental fracturability and sensory crumbliness and chewiness. SRA

Yoghurts

837

Gassem (MA) and Frank (JF). **Physical properties of yoghurt made from milk treated with proteolytic enzymes.** *Journal of Dairy Science* 74(5): 1991; 1503-1511

Milk was treated with either crude extracts of bacterial protease or purified plasmin. Treated milk was immediately made into yoghurt, which was stored at 7°C and analyzed after 1, 8, and 15 days. Yoghurt made from milk pretreated with microbial protease had higher firmness, syneresis, and apparent viscosity than the untreated product. Yoghurt made from milk treated with plasmin had significantly lower firmness and apparent viscosity, and after 8 days, lower synersis as compared with the control. Yoghurt made from milk treated with either protease had lower water-holding capacity and protein hydration than untreated controls. Proteolysis of milk did not produce consistent effects on yoghurt culture levels, although fermentation was more rapid in the treated milks. Results indicate that proteolysis of milk results in yoghurt of substantially different physical properties and that the effects of proteases from psychrotrophic bacteria on the properties of yoghurt differ from the effects of plasmin. AA

838

Fellows (JW), Chang (SW) and Keller (SE). **Effect of sundae-style yoghurt fermentation on the aspartame stability in fruit preparation.** *Journal of Dairy Science* 74(10): 1991; 3345-3347

The stability of aspartame during fermentation of milk to manufacture yoghurt with fruit on the bottom (sundae-style yoghurt) using different direct-set cultures and incubation temp. was assessed. Aspartame recovery based on original amount was determined using HPLC. Aspartame recovery was 95 or 90% in yoghurts produced using a 6 h incubation at 43.3°C and 13 h at 32.2°C, respectively. Aspartame, therefore, has excellent stability in fruit preparation during the manufacture of sundae-style yoghurt. AA

Milk proteins

839

Traore (F) and Meunier (J-C). **Cross-linking activity of placental F $XIII_a$ whey proteins and caseins.** *Journal of Agricultural and Food Chemistry* 40(3): 1992; 399-402

Human placental factor XIII (F XIII), purified from a commercial source and activated by Ca, was used to enzymatically cross-link individual whey proteins (α-lactalbumin, β-lactoglobulin, bovine serum albumin) and a mixture of total caseins and bovine serum albumin. Polymerization of DTT-reduced α-lactalbumin and β-lactoglobulin was incomplete. Saturation of the response was reached in the time range 2 - 3 h and the substrate concn. range 10 - 20 mg/mL. A heat treatment had no effect on the polymerization of α-lactalbumin by F $XIII_a$, whereas β-lactoglobulin gelled. A nonenzymatic gelation of both reduced proteins was observed above 50 mg/mL in the presence of Ca. Analysis of reaction products between BSA and caseins indicated that both proteins were polymerized, in the absence of DTT, through the formation of intermolecular cross-links. In contrast, polymerization of BSA required this reductant. AA

MEAT AND POULTRY

Meat

840

Robe (GH) and Xiong (YL). **Phosphates and muscle fiber type influence thermal transitions in porcine salt-soluble protein aggregation.** *Journal of Food Science* 57(6): 1992; 1304-1307, 1310

Salt-soluble proteins (SSP) were extracted from porcine Serratus ventralis (red), Vastus intermedius (red) and Longissimus dorsi (white) muscles and heated to examine dynamic changes and transitions in protein aggregation. At pH 6.0, red muscle SSP typically showed 1 or 2 transitions and white muscle

SSP exhibited 3 transitions. Addition of ortho-, pyro-, tripoly- and hexametaphosphate up to 1% increased SSP transition temp. and altered transition patterns; NaCl at comparable ionic strengths did not show this effect. SSP transitions were most affected by 0.15 - 0.25% tripolyphosphate and low pH (< 6.0). Red and white SSP exhibited different thermal properties and responses to phosphate treatments. These findings indicate red and white muscle types should undergo different processing treatments for optimum quality meat products. AA

841

Alvarado (R), Rodriguez-Yunta (MA), Hoz (L), Fernando (GD) and Ordonez (JA). **Rapid *p*-nitroaniline test for assessing microbial quality of refrigerated meat.** *Journal of Food Science* 57(6): 1992: 1330-1331

The *p*-nitroaniline test, a rapid and inexpensive method to estimate microbial quality of refrigerated meat, allows detn. of psychotroph levels between 10^4 and 10_8 cfu/cm^2 in 2.5 h. The method correlates ($r = 0.88$, $p < 0.001$) well with the standard plate count technique. Bacterial loads higher than 10_5 cfu/cm_2 develop a colour intense enough to be detected visually. GS

842

Skytta (E), Hereijers (W) and Mattila-Sandholm (T). **Broad spectrum antibacterial activity of *Pediococcus damnosus* and *Pediococcus pentosaceus* in minced meat.** *Food Microbiology* 8(3): 1991: 231-237

Three *Pediococcus* strains producing bacteriocin-like inhibitors were tested for their antibacterial effects. The study was carried out in minced meat inoculated with 4 test organisms, *Yersinia enterocolitica*, *Listeria monocytogenes* or *Pseudomonas fragi* and *Pseudomonas fluorescens*. The inoculation levels of pediococci varied within a range of 10^3 - 10^8 cfu g^{-1}, whereas the number of test organisms inoculated was approx. constant at 10^2 cfu g^{-1}. In order to enhance the bacteriocin production of pediococci, the inoculated samples were first kept at 15°C for 2 days, thereafter they were stored at 6°C. The growth of test organisms was followed at 2 or 3-day intervals for 2 wks. The results showed that all strains of pediococci inhibited the growth of test organisms at the highest inoculation level, lower levels did not have any effect on the growth of test organisms. In parallel, the experiments were carried out by replacing the viable *Pediococcus* cells by a cell-free crude extract of inhibitors isolated from the growth medium of pediococci. The extracts showed a strong inhibition potential against all test organisms. The pH values of the samples did not significantly decrease during the storage period. The results showed evidence that selected strains of pediococci have a board spectrum antibacterial potential in a food matrix due to inhibition of Gram-negative organisms. AA

843

Al-Dagal (M), Mo (O), Daniel (YC), Fung (YC) and Kastner (C). **A case study of the influence of microbial quality of air on product shelf-life in a meat processing plant.** *Dairy, Food and Environmental Sanitation* 12(2): 1992: 69-70

The airborne microbes in the meat processing plant were monitored twice a month for 3 months with concern of shelf-life of cooked products (Weiners). The aerobic plate counts in the first 2 wks were 100 to 300 CFU/m^3 in all processing areas, except the hallway and the showering areas (where the number exceed 300 CFU/m^3). Subsequent samples generally gave higher counts. Suggested changes included eliminating stacked boxes in the hallway where the product was showered, decreasing the cross traffic among workers, and more frequent cleaning. Other suggfested changes in processing practices, after further evaluation of the microbial quality of air, included showering of the product inside the smoke house and reducing the time from cooking until packaging. SRA

Beef

844

Egbert (WR), Huffman (DL), Chen (CM) and Jones (WR). **Microbial and oxidative changes in low-fat ground beef during simulated retail distribution.** *Journal of Food Science* 57(6): 1992: 1269-1274, 1293

Low-fat ground beef product containing water, carrageenan, encapsulated salt and hydrolyzed vegetable protein (carrageenan based) was compared to a low-fat, all beef control during simulated commercial manufacturing and retail distribution. Few differences were found ($P > 0.05$) in aerobic plate counts, populations of psychrotophs or mold and yeast populations for the 2 products. Differences were little in oxidative stability and microbial growth. Hunter colour 'a' values (redness) and overall colour scores for surface colour were higher ($P < 0.05$) for carrageenan-based product than all the other products. Retail display of the low-fat products in oxygen-permeable (aerobic) packaging resulted in greater product discoloration than that of products in oxygen-impermeable packaging. BV

845

Maruri (JL) and Larick (DK). **Volatile concentration and flavour of beef as influenced by diet.** *Journal of Food Science* 57(6); 1992: 1275-1281

Yearling steers were fed with 3 types of diet (i) Tifleaf pearl millet; (ii) millet with restricted grain; or (iii) millet followed by grain ad libitum. In 20% fat ground beef and subcutaneous fat, gamey/stale off-flavour decreased and roasted beef flavour increased when steers were fed with grain. Compounds (59) including acids, alcohols, aldehydes, diterpenoids, hydrocarbons, and lactones were identified in the purge-and-trap volatiles. Diterpenoids positively correlated with gamey/stale off-flavour and negatively correlated with roasted beef flavour. Lactones positively correlated with roasted beef flavour and negatively correlated with gamey/stale off-flavour. BV

846

Unklesbay (N), Unklesay (K), Hsieh (F) and Sandik (K). **Thermophysical properties of extruded beef/corn flour blends.** *Journal of Food Science* 57(6); 1992: 1282-1284

Three beef/corn meal blends extruded at 91 and 109°C was analysed for thermophysical properties ((TPP), thermal properties, specific heat (SH) thermal conductivity (TC) and density). Density values ranged from 1,054 to 1,091 kg/m^3; specific heat was 2.944 to 3.055 kJ/kgK; and thermal conductivity 0.26 to 0.39 W/mK. Thermal diffusivity values ranged from 0.831 to 1.200(x 10^{-7} m^2/sec). Inclusion of white or yellow corn flour (CF) and soy fiber, several differences among the TPP were observed. A high end point product temp. (109°C) after extrusion resulted in less moisture in the product, compared to those products extruded at lower temp. (91°C). No significant effect on thermal conductivity values were observed except for formulations with yellow CF. This indicates that formulations with white CF need greater precision in TC measurements for using as a quality control criterion in extrusion. SH values of extruded products showed no significant differences with regard to formulation or extrusion conditions. BV

847

Cambero (MI), Seuss (I) and Honikel (KO). **Flavour compounds of beef broth as affected by cooking temperature.** *Journal of Food Science* 57(6); 1992: 1285-1290

Beef broth obtained on heating at 85°C for 60 min had the most intense brothy flavour. A significant correlation between cooking temp. of the broth and the concn. of certain compounds such as free amino acids (FAA) ($r = 0.88$, $P < 0.005$), carnosine ($r = 0.83$, $P < 0.005$) and inosine 5'-monophosphate (IMP) ($r = 0.94$, $P < 0.005$) was detected. Sensory evaluation indicated that a wide mixture of FAA, peptides of low mol. wt. (less than or equal to 300 daltons) and IMP played an important role in the flavour intensity of beef broth. GS

848

Jones (SDM), Jeremiah (LE), Tong (AKW), Lutz (S) and Robertson (WM). **The effects of marbling level, electrical stimulation and post-mortem aging on the cooking and palatability properties of beef rib-eye steaks.** *Canadian Journal of Animal Science* 71(4); 1991: 1037-1043

849

El-Shimi (NM). **Influence of microwave and conventional cooking and reheating on sensory and chemical characteristics of roast beef.** *Food Chemistry* 45(1); 1992: 11-14

Microwave-treated samples showed more flavour, less juicy and tender than the conventionally treated samples but in chemical composition there was no difference. SD

850

Lewis (GJ), Purslow (PP) and Rice (AE). **The effect of conditioning on the strength of perimysial connective tissue dissected from cooked meat.** *Meat Science* 30(1); 1991: 1-12

851

Prasai (RK), Acuff (GR), Lucia (LM), Hale (DS), Savell (JW), Morgan (JB). **Microbiological effects of acid decontamination of beef carcasses at various locations in processing.** *Journal of Food Protection* 54(11); 1991: 868-872

Hot (55°C), dilute (1% v/v) lactic acid was sprayed on beef carcass surfaces immediately after dehiding, after evisceration (immediately before chilling), or at both locations. Surface samples of carcasses were examined for total aerobic plate counts (APCs) and for the presence of *Salmonella* and *Listeria*. APCs of treated beef carcasses were lower ($P < 0.05$) than those of control carcasses. APCs were determined both at slaughter day 0 (immediately after carcasses enter the chill room) and after 72 h postmortem. At day 0, reduction in $\log_{10}$ APC by more than 90% occurred when carcasses were treated with lactic acid after evisceration or both after dehiding and after evisceration. The effect of lactic acid decontamination was greatest on carcasses treated with lactic acid both after dehiding and after evisceration. No further reductions in APCs of carcasses were observed on samples taken 72 h postmortem. No difference in colour between

control and acid-treated carcasses was observed. All samples tested for the presence of *Salmonella* were negative. *Listeria* was detected in 3 samples from control carcasses only. Samples obtained from strip lions of acid-treated or control carcasses did not show any consistent pattern of differences in microbiological counts. Additional data collected from carcasses sprayed with lactic acid in 3 different sized slaughter plants showed that irrespective of differences in size of slaughter facility, mean APCs of acid-treated carcasses were significantly ($P < 0.05$) lower than those of control carcasses. AA

Mutton

Lambs

852

Farouk (MM), Price (JF) and Salih (AM). **Post-exsanguination infusion of ovine carcasses: Effect on tenderness indicators and muscle microstructure.** *Journal of Food Science* 57(6): 1992: 1311-1315

Lambs were assigned to 3 treatment groups: control (Ctr), infused with 10% volume (by wt.) of a tenderizing blend (NCa), and NCa plus 0.015M $CaCl_2$ (WCa). Compared to Ctr and WCa, NCa-treated samples had lower shear force values ($P < 0.05$) and higher percent change in myofibrillar fragmentation index ($P < 0.05$). SDS-PAGE of infused samples revealed the appearance at 24 h postmortem of 22 - 30 kd protein components. Scanning electron micrographs of NCa myofibrils showed they were more fragmented, fractured, or split and had wider interfibrillar spaces compared to Ctr and WCa. The fracture plane of muscles immediately postmortem was along the endomysial-sarcolemmal sheath, while at 24 h postmortem the sheath was weakened enough for the fracture to occur along the surface of the myofibrils. AA

Pork

853

Lambert (AD), Smith (JP) and Dodds (KL). **Physical, chemical and sensory changes in irradiated fresh pork packaged in modified atmosphere.** *Journal of Food Science* 57(6): 1992: 1294-1299

A substantial extension in sensory shelf-life and < 2 to 2 days at 25°C (9 to 26 days at 5°C) of fresh pork was achieved using modified atm. packaging in conjunction with low-dose irradiation (1 KGy) and in the absence of O_2. For max. extension of shelf-life, product should be irradiated under anaerobic conditions since irradiation in presence of O_2 adversely affected physical, chemical and sensory characteristics of the product. BV

854

Larson (EM), Holm (ET), Marchello (MJ) and Slanger (WD). **Physical and sensory characteristics of fresh pork leg roasts cooked at low temperatures.** *Journal of Food Science* 57(6): 1992: 1300-1303, 1315

Fresh pork leg roasts cooked at low temp. (82 and 93°C) yielded a juicer, more tender and flavourful product and with less warmed-over-flavour after refrigeration and reheating than roasts cooked at 121 and 163°C. Aerobic mesophilic bacteria were fewer in roasts cooked at 93°C. Cooking pork at low temp. for extended periods of time decreased total cooking losses, increased meat yields and minimized cost/serving. GS

855

Martin (R), Wardale (RJ), Jones (SH), Hernandez (PE) and Patterson (RLS). **Monoclonal antibody sandwich ELISA for the potential detection of chicken meat in mixtures of raw beef and pork.** *Meat Science* 30(1): 1991: 23-31

856

Unklesbay (K), Unklesbay (N) and Biedrzycki (K). **Convection heat transfer coefficient for a restructured pork/soy hull product.** *Journal of Food Process Engineering* 14(3): 1991: 197-208

Heat transfer coeff., h, ($J/cm^2°C$ min) were determined for a pork/soy hull mixture during heating in a convection oven (142°C) with and without control of the dew point. Data were acquired by heat processing 5 stacked layers of product (10 x 10 x1 cm) so that heat was only conducted into the top surface. One experiment was designed to determine h when the second layer from the top reached one of 6 temp.: 20, 32, 44, 56, 68 and 77°C, with no control of the dew point. The second experiment determined h for 60 min of heating for 5 dew point levels: 6, 21, 31, 40 and 50°C. Without the control of humidity, values for h ranged from 0.0170 - 0.0366 $J/cm^2°C$ min. The heat transfer coeff. increased with temp. and heat processing time. Product yield and surface area ratios decreased as h increased. When RH was controlled, values for h ranged from 0.0167 - 0.0270 $J/cm^2°C$ min, decreasing for dew points above 31°C. AA

Products

857

Hattula (MT) and Wallin (HC). **Enzymatic determination of free glutamic acid in dried soups and in minced sausages: NMKL collaborative study.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 921-925

858

Kato (T), Simizu (K), Harata (A) and Sato (Y). **Effects of smoking on staphylococcal growth and enterotoxin production in fermented sausage.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991: 344-349

Changes in the viable counts and enterotoxin production of *Staphylococcus aureus* during fermentation of sausages were investigated. By smoking at 37°C for 6 h, staphylococcal growth and enterotoxin production on the surface of sausages were inhibited, even if lactic starter was not added. On the other hand lactic starter could inhibit *S. aureus* growth in the center of unsmoked sausages. By the combination of lactic starter and smoking at the beginning of fermentation stage, the staphylococcal growth and enterotoxin production were effectively inhibited at both surface and center of sausages, while smoking practically exerted no effect on lactic fermentation of sausages. AA

859

Conventry (J) and Hickey (MW). **Growth characteristics of meat starter cultures.** *Meat Science* 30(1): 1991: 41-48

The Australian Code of Practice for manufacture of dry and semi-dry sausage (salami) states that fermentation temp. must not exceed 25°C and that a pH of 5.2 must be achieved in the product within 48 h. In order to select the most appropriate starter cultures for fermentation, *Lactobacillus plantarum*, *Pediococcus pentosaceus* and *Staphylococcus carnosus* were characterised with respect to growth and acid production determined at constant pH (4.7, 5.5 and 6.3). *L. plantarum* and *P. pentosaceus* showed similar characteristics over the pH range studied while *S. carnosus* was sensitive to lower pH. Also, *P. pentosaceus* showed greater psychrotrophic growth without pH control than *L. plantarum* or *S. carnosus*. Salami made with *P. pentosaceus* maintained higher viable numbers in the product over 8 days than did *L. plantarum*. Growth of *S. carnosus* in salami could not be detected in the presence of the more pH-tolerant organisms. The growth of *L. plantarum* and *P. pentosaceus* did not prevent the development of high levels of non-starter flora, a factor that can be important in determining salami quality. However, the more psychrotrophic *P. pentosaceus* ensured a greater dominance of starter over non-starter flora. AA

860

Okayama (T), Fujii (M) and Yamanoue (M). **Effect of cooking temperature on the percentage colour formation, nitrite decomposition and sarcoplasmic protein denaturation in processed meat products.** *Meat Science* 30(1): 1991: 49-57

The effect of cooking temp. and time on the percentage colour formation, nitrite decomposition and denaturation of sarcoplasmic proteins in processed meat products was investigated in detail. The colour forming percentage increased with a rise in temp. of heating, especially at 50 - 60°C ($P < 0.05$). The percentage nitrite decomposition was promoted by the retention time of cooking rather than by cooking temp. ($P < 0.05$). The percentage of sarcoplasmic proteins denautred was enhanced by heating temp. in the range 50 - 80°C (especially at 50 - 60°C) ($P < 0.05$). The relationship between the percentage colour formation and the percentage of sarcoplasmic proteins denatured is discussed. The SDS-PAGE patterns of the heat-treated samples revealed the components of the sarcoplasmic proteins which had been denatured. AA

Ham

861

Molina (I) and Toldra (F). **Detection of proteolytic activity in microorganisms isolated from dry-cured ham.** *Journal of Food Science* 57(6): 1992: 1308-1310

Proteolytic activities of *Pediococcus pentosaceus* and *Staphylococcus xylosus*, isolated from Spanish serrano dry-cured ham, were studied. *Ped. pentosaceus* showed a stronger leucine and valine arylamidase activities and *Staph. xylosus* showed a very weak leucine arylamidase activity. BV

Poultry

862

Ravinder Reddy (S). **Pesticides contamination of feed and its effect on poultry.** *Poultry Guide* 30(1): 1993: 27-29

Reports the pesticide residues in poultry diet and their toxic effects on the egg shell thickness and reproductive activity of poultry. Safe and judicious use of pesticides is recommended. GS

Chickens

863

Pandey (NK), Dev Roy (AK) and Ram Gopal. **Carcass characteristics, meat yield and quality of synthetic dam line broiler chicken.** *Indian Journal of Poultry Science* 27(2): 1992: 95-99

Carcass traits, cooking yield and meat quality of 2 types of broiler chicken (i) synthetic dam line (SDL) and unselected control line (IC_3 control) were compared. Genetic group or sex had no significant effect on the water holding capacity, pH , moisture, total protein and fat contents of breast and leg meats. However, SDL broilers contained less moisture and more fat in breast and leg meats than the control line. Total protein content remained the same in both the groups. SDL broilers had higher live and dressed carcass wt., total edible and giblet yields and deboned meat with higher breast and lower wings wt. than the control. Cooking and meat yield of male carcass cuts were superior to females. But the ratios of meat to bone and breast to leg meat were not influenced by genetic group or sex. GS

864

Young (LL), Papa (CM), Lyon (CE) and Wilson (RL). **Moisture retention and textural properties of ground chicken meat as affected by sodium tripolyphosphate, ionic strength and pH.** *Journal of Food Science* 57(6): 1992: 1291-1293

Batches of ground chicken meat were mixed with 10% sol. containing 0.0 - 5.0% sodium tripolyphosphate and sufficient NaCl to adjust the ionic strength (IS) of the sol. from < 0.7 to 6.0 at pH 6.5 to 9.5 in a 6 x 4 x 7 factorial experimental design. Patties prepared from the mixtures were evaluated for pH, cooking loss, and objective texture characteristics. Most effects of STPP were attributable to the direct effect of STPP on IS. However the ability of the phosphate to alter textural properties was greater at a pH value near the pK_a of the phosphate. AA

865

Alvarez (VB), Smith (DM) and Flegler (S). **Effect of extruder die temperature on texture and microstructure of restructured mechanically deboned chicken and corn starch.** *Food Structure* 10(2): 1991: 153-160

Chicken/15% corn starch extruders restructured at die temp. of 25, 71, 82, 93, 104 and 115°C were evaluated by SEM and for proximate composition. Total solids and fat decreased and protein increased as the temp. increased. Extruders restructured at die temp. 71 and 82°C exhibited microstructures similar to salt soluble muscle protein gels and extruders prepared at above 93°C similar to gelatinized starch. SD

866

Marshall (DL), Wiese-Lehigh (PL), Wells (JH) and Farr (AJ). **Comparative growth of *Listeria monocytogenes* and *Pseudomonas fluorescens* on precooked chicken nuggets stored under modified atmospheres.** *Journal of Food Protection* 54(11): 1991: 841-843, 851

The purpose of this study was to determine the effects of modified atm. packaging (MAP) on growth of *L. monocytogenes* and *P. fluorescens* on precooked darkmeat chicken nuggets during refrigerated storage. The 2 organisms were separately inoculated on nuggets and stored under modified atm. (MA_1 or MA_2) at 3, 7 or 11°C. The results show that the growth of *P. fluorescens* was inhibited by MAP to a greater extent than was the growth of *L. monocytogenes*. Even though growth of *L. monocytogenes* was inhibited by MAP, the organism was still capable of growth at all 3 temp. The effectiveness of MAP decreased with increasing temp. Little difference in inhibition of growth was observed for either organism with MA_1 or MA_2. AA

Broilers

867

Ajuyah (AO), Lee (KH), Hardin (RT) and Sim (JS). **Influence of dietary full-fat seeds and oils on total lipid, cholesterol and fatty acid composition of broiler meats.** *Canadian Journal of Animal Science* 71(4): 1991: 1011-1019

The incorporation of full-fat flax seeds or flax oil plus flax meal into broiler diets resulted in elevated deposition levels of ω-3 fatty acids (α-linolenic acid, 18:3ω3 and eicosapentaenoic acid, 20:5ω3 in white and dark broiler meat. GS

Ducks

868

Ndi (EE) and Brekke (CJ). **Thermal aggregation properties of duck salt-soluble proteins at selected pH values.** *Journal of Food Science* 57(6): 1992: 1316-1320

Thermal aggregation properties of duck breast and leg salt-soluble proteins (SSP) were studied at pH 5.50, 5.75 and 6.00. At pH 5.50, a major transition for breast was observed at 60.3°C and for leg at 41.8°C. At pH 5.75, major transitions at 44.6 and 43.2°C were obtained, respectively, for the breast and leg SSP. Three transitions at 46.0, 53.0°C and 59.0°C were exhibited by breast SSP at pH 6.00,

whereas only 2 major transitions at 47.4 and 54.0°C were identified in leg SSP. Changes in transition peak heights and shifts in transition temp. as a result of pH changes indicated that, depending on fiber type, pH may enhance or suppress the aggregation behaviour of specific constituents of the myosin/actomyosin complex, thereby altering the overall aggregation pattern of the protein preparation. AA

Products

Eggs

869

Korane (UN), Sarag (AN), Sadekar (RD), Sirothia (AR) and Dharmadhikari (DN). **Effect of replacement of maize with prosomillet on egg yolk pigmentation and egg quality traits.** *Indian Journal of Poultry Science* 27(3): 1992: 144-147

Replacement of maize with prosomillet (*Panicum miliaceum*) at 50% and 100% levels was tried in the layer's ration and its effects on egg yolk pigmentation and other egg quality traits were studied. It was observed that replacement of maize produced paler egg yolk, though it did not affect any of the internal and external qualities of the eggs. The paleness of egg yolk in replacement diet was attributable to the lower β-carotene content in prosomillet (4.21 mg/kg) than in maize (8.99 mg/kg). AA

870

Singh (RP) and Jitendra Kumar. **Evaluation of selection procedures to improve annual egg production and egg weight in chickens.** *Indian Journal of Poultry Science* 27(2): 1992: 71-77

Pullets and cockerels were selected at the proportion of 16.6 and 6.25% respectively for propogation. Egg production upto 280 days of age, egg wt. (EW) during 38 - 40 wk of age and annual egg production (AEP) of selected pullets in the next generation were analysed. It was found that the selection of pullets in single stage did not improve egg production and EW simultaneously. Two stage selection i.e. initial selection on egg wt. (50%) and on an index of part egg production and dams's annual egg production resulted in simultaneous improvement of 2.13 eggs in AEP and 0.1 g in EW. Three stage selection is expected to be superior to two stage selection. GS

871

Saito (M), Oh-Hashi (A) and Yamaguchi (M). **Liver microsomal mixed-function oxidases in response to dietary whole egg protein levels in rats.** *Journal of Nutritional Science and Vitaminology* 38(2): 1992: 163-176

Relation between the activity of liver microsomal mixed-function oxidase system and dietary protein level was investigated in rats using purified whole egg protein, i.e. free from limiting amino acids. The animals were given either a diet containing 0, 5, 10, 20 or 40% of protein (experiment 1) or a diet containing 5, 10, 15 or 20% of protein (experiment 2) for 16 days. In experiment 2, half of the rats of each group were intraperitoneally injected sodium phenobarbital (PB) to induce the mixed-function oxidase system. The cytochrome P-450 content plateaued even at 5% level of dietary protein in experiment 1 and in the PB-untreated groups of experiment 2. However, it showed the highest value at 15% protein level in the PB-treated groups of experiment 2, indicating a shift of the response peak to a higher protein level due to an increase in protein requirement. Cytochrome P-450 reflected most specifically the dietary protein levels when the enzyme system was induced by PB. The 15% protein levels, equivalent to 14.1 protein calories %, is a little higher than the optimal dietary level of whole egg protein ever obtained by usual nutritional indices. AA

872

Williams (KC). **Some factors affecting albumen quality with particular reference to Haugh unit score.** *World's Poultry Science Journal* 48(1): 1992: 5-16

The maintenance of albumen quality during egg storage is dependent on the eggs being cooled quickly and held subsequently at low temp. (0°C). Oiling of eggs within 24 h of lay is effective in retarding albumen deterioration but does not replace the need for cool storage. Review. 52 references. GS

873

Katusin-Razem (B), Mihaljevic (B) and Razem (D). **Radiation-induced oxidative chemical changes in dehydrated egg products.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 662-668

Radiation-induced buildup of lipid hydroperoxides (LOOH) and destruction of carotenoids were followed in whole egg powder and egg yolk powder as functions of dose, dose rate, and the presence of oxygen. In the absence of air the formation of LOOH was limited by the available oxygen, while destruction of carotenoid progressed linearly with dose; neither process depended on the dose rate. In the presence of air, the accumulation of LOOH and the destruction of carotenoids were strongly coupled and inversely proportional to the dose rate. The induction dose of 2.5 kGy was observed in air in both whole egg powder and egg yolk powder, independent

of the dose rate. The practical consequence is that radiation decontamination can be carried out in the presence of air at the highest available dose rate by a dose not exceeding 2.5 kGy to avoid extensive degradation. This dose is adequate for a 10^3 reduction factor of *Salmonella* and well within the threshold dose of 3 kGy for organoleptic changes. AA

Egg white

874

Cotterill (OJ), Chang (CC), McBee (LE) and Heymann (H). **Metallic cations affect functional performance of spray-dried heat-treated egg white.** *Journal of Food Science* 57(6): 1992: 1321-1342, 1347

The functional performance of 4 metallic cations (Cu^{++}, Al^{+++}, Fe^{+++}, Zn^{++}) in spray-dried, heat-treated egg white were evaluated. Cu^{++} excelled in all functional categories involving foams and angel food cakes. Zn^{++} was least effective. These data suggest that Cu^{++} would be a suitable additive to spray-dried egg white systems. AA

Egg yolk

875

Causeret (D), Matringe (E) and Lorient (D). **Mineral cations affect microstructure of egg yolk granules.** *Journal of Food Science* 57(6): 1992: 1323-1326

The physico-chemical characteristics of the egg yolk medium such as pH, ionic strength and bivalent cations affected the microstructure of the granules in egg yolk. The phospho calcic bridges were the major causes of protein association in granules, containing 80% of the Ca. Addition of a Ca - chelating agent, EDTA caused a complete destruction of granules. On the other hand addition of bivalent or trivalent cations at low concn. strengthened the structure which resisted changes in pH or ionic strength. GS

SEAFOODS

876

Anandavally (N). **"HACCP" concept in quality assurance in seafood industries.** *Seafood Export Journal* 24(6): 1992: 5-9

HACCP is the best system for improving the microbiological safety of foods. Anticipation of hazards, identification of critical control points (CCP), description, monitoring of CCPs, corrective actions to be taken when operation is out of control: and verifications of the working of HACCP are detailed. The utilization of HACCP concept and the quality control for seafood group (i) fresh and frozen fish and crustaceans: (ii) heat treated fish: (iii) dried and dry-salted fish and (iv) molluscs including fresh and frozen mussels, clams, oysters in shell or shucked are discussed. GS

877

Mishra (R) and Dora (KC). **Seafood processing industry in Orissa - potential for its development.** *Seafood Export Journal* 24(8): 1992: 7-9

Reports the importance of increasing the fish production, making it available in good condition to consumers at reasonable cost: methods of preservation like sundrying, salt curing, freezing and canning: and by-products utilization. Data regarding fish production, utilization, disposition and the byproduct utilisation of Orissa fish industry are also given. GS

Clams

878

Gourama (H), Tsai (WYJ) and Bullerman (LB). **Growth and production of enterotoxins A and D by *Staphylococcus aureus* in salad bar ingredients and clam chowder.** *Journal of Food Protection* 54(11): 1991: 844-847

Growth and production of enterotoxins A and D (SEA, SED) by two strains of *Staph. aureus* were determined in salad bar ingredients and clam chowder. Salad bar ingredients included lettuce, canned black olives, canned green olives, tomato, green pepper, blue cheese· salad dressing, blue cheese crumbles, celery, and croutons. Total *Staph. aureus* were determined by plate count on Baird-Parker agar. Enterotoxins were quantified by using an ELISA technique. *Staph. aureus* did not survive in salad dressing, with pH 4.3. With the exception of olives and blue cheese, *Staph. aureus* survived on all ingredients for more than 12 h. After 24 h, the total number of cells decreased on most of the ingredients. *Staph. aureus* grew well on green pepper during the first 24 h, reaching 10^5cfu/g, but no enterotoxins were detected. *Staph. aureus* also increased in moist and dry plain croutons, but there was no detectable production of enterotoxins. *Staph. aureus* growth was excellent in clam chowder with cell counts exceeding 10^8 CFU/g after 12 h at 42°C. Production of SEA and SED began shortly after 3 h. Maximal levels of SEA and SED were 0.29 and 1.6 ng/g, respectively, after 12 h. In brain heart infusion broth, the production of SEA and SED

reached 21.9 and 36.3 ng/ml, respectively, after 24 h at 37°C. AA

Scallops

879

Chung (SL) and Merritt (JH). **Kinetic study of quality losses in frozen scallop meats.** *Journal of Food Process Engineering* 14(3): 1991: 209-220

The rates of changes of texture, cook drip and free fatty acid during frozen storage of scallop meats at -30, -18, -12, -8 and -5°C were studied. Both the physical and chemical changes were found to follow first order kinetics. The activation energies for toughness, cook drip and free fatty acid were 43.6, 69.3 and 37.9 kJ/mol, respectively. AA

Shrimps

880

King (JM), McEvily (AJ) and Radha Iyengar. **Liquid chromatographic determination of the processing aid 4-hexylresorcinol in shrimp.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 1003-1005

A rapid, sensitive, liquid chromatographic (LC) method has been developed for detn. of residuals of the processing aid, 4-hexylrescorcinol, on shrimp meat. An aqueous homogenate of shrimp meat is extracted with ethyl acetate followed by precolumn preparation on a silica Sep-Pak cartridge. LC detn. is performed with a Nova-Pak C18 column, with UV detection at 214 nm. Sensitivity was 0.006 µg, and recovery from shrimp meat samples of known 4-hexylresorcinol addition was 94%. Shrimp treated with 4-hexylresorcinol under the recommended dip protocol had mean residuals of 1.18 p.p.m., with standard deviation of 0.13 p.p.m. AA

Squilla

881

Reddy (HRV). **The potential uses of squilla (Stomatopods).** *Seafood Export Journal* 24(7): 1992: 24-25

Annual landings of squilla (somatopod fishery) in India during 1990-91 was estimated as 75000 t. Eventhough adult stomatopods contain about 35% flesh and 45% protein (dry wt.) it is not consumed due to the large number of body spines. Chitin, chitosan and their derivatives which have wide industrial application in photography, chromatography, paper, film and fibres, textile, coagulant, medical, adhesive and coatings, agriculture and food, could be extracted from squilla. Due to high cost of technology and the seasonal nature of the raw material it is not commercially exploited. GS

Fish

882

Ayyannan (M), Chellakumar (A), Tamilmani (V) and Udayasoorian (C). **Recycling of poultry waste in integrated fish farming.** *Madras Agricultural Journal* 78(5-8): 1991: 200-203

Feasibility and economic viability in fish-cum-poultry farming in Tamilnadu was studied. By recycling the poultry waste the production of fish was increased by 18%, the production cost reduced from Rs. 5.75 to Rs. 2.00/kg, the input cost reduced to 65% of the total input and net profit of Rs. 17,000/- per ha obtained. GS

883

Gomez-Basauri (JV) and Regenstein (JM). **Processing and frozen storage effects on the iron content of cod and mackerel.** *Journal of Food Science* 57(6): 1992: 1332-1336

Processing and subsequent frozen storage affected the Fe content of cod (*Gadus morhua*) and mackerel (*Scomber scombrus*) muscle tissue. Frame mince was obtained from the bone rack, without the head or viscera remaining, after filleting. Frame mince had significantly higher Fe levels than intact fillets with or without skin or fillets that were subsequently minced. Skin-on fillets had more Fe than skin-off fillets. Cod frame mince had about 50% heme Fe, while mackerel frame mince ranged from 20 - 64%. Nonheme Fe increased during frozen storage due to heme breakdown. Storage above -14°C was more deleterious to the heme molecule than lower temp. (-20°C or -40°C). AA

884

Yoshida (A), Sasaki (K) and Morita (S). **Effects of spices, seasonings and food additives on volatility of volatile acids from fish muscle.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991: 294-302 (Ja)

Effects of 18 spices, 9 seasonings and 9 food additives on volatility of volatile acids from fish muscle homogenate were examined. Volatile acids were determined on the distillate of homogenated mixture of muscle and a test compound after distillation at 90°C for 30 min. Acetic acid, propionic acid, *n*-butyric acid and/or *n*-caproic acid

were vaporized from the muscle homogenate of salmon, tuna, pacific saury and plaice, but hardly from that of mackerel muscle seabream, sardine and yellowtail. Among the species tested, and addition of clove to mackerel muscles released a high concn. of acetic acid, which was originated from clove itself. Increased release of volatile acids from mackerel muscle by addition of seasonings such as Worcester sauce, miso (red), tomato ketchup, white wine or vinegar originated from those in the test compounds and was probably due to decreased pH of the mixture by adding the test compounds. Any food additives tested had no effect on volatility of volatile acids. In the exp. with teh homogenated mixture of mackerel muscle and 8 standard volatile acids, release of volatile acids was increased by an addition of clove, Worcester sauce, tomato ketchup, white wine, vinegar, ascorbic acid or sorbic acid, but decreased by that of vanillin or maltol. Cyclodextrin failed to reduce the release of volatile acids. Volatility of volatile acids was greatly influenced by pH of the homgenated mixture: volatile acids were hardly released about pH 6; *n*-butyric and *n*-caproic acids were released below pH 5; and propionic and *iso*-butyric acids below pH 4. AA

885

Suvendu Bhattacharya, Das (H) and Bose (AN). **Rheological behaviour during extrusion of blends of minced fish and wheat flour.** *Journal of Food Engineering* 15(2): 1992: 123-137

The effect of the extrusion process variables, such as length/diam. (L/D) ratio of the extruder, feed ratio (ratio of the solids of fish and wheat flour), temp. of extrusion, and screw speed on the rheological behaviour of blends of partially dried low-cost minced fish and wheat flour were studied. A single-screw, variable-length extrusion cooker, with a barrel bore of 25 mm was developed for this purpose. Pseudoplastic behaviour was observed during extrusion. The shear rate-shear stress data can be fitted (r greater than or equal to 0.93, p less than or equal to 0.01) to the power-law model. The L/D ratio of the extruder affects the rheological behaviour of the food dough during extrusion, and hence, the L/D ratio should also be considered as a process variable. A simple mathematical model to predict the rheological properties such as the consistency coeff., flow behaviour index, and apparent viscosity of blends during extrusion, was proposed. AA

Mackerels

886

Gomez-Basauri (JV) and Regenstein (JM). **Vacuum packaging, ascorbic acid and frozen storage effects on heme and nonheme iron content of mackerel.** *Journal of Food Science* 57(6): 1992: 1337-1339

Vacuum packaging and ascorbic acid were tested for their ability to prevent heme Fe loss in mackerel (*Scomber scombrus*). Vacuum packed samples had less heme breakdown than air packed samples at frozen storage temp. above -20°C. Ascorbic acid protected the heme at all temp. when compared to air or vacuum packed samples. AA

Salmon

887

Reid (RA) and Durance (TD). **Textural changes of canned chum salmon related to sexual maturity.** *Journal of Food Science* 57(6): 1992: 1340-1342

Eating quality of chum salmon decreases as the fish migrate towards natal streams to spawn. Fish were assigned to maturity grades according to outward appearance and processed according to normal commercial practice. Texture of the canned product was assessed by 9 trained sensory judges and by instrumental texture profile analysis (TPA). Both methods revealed significant differences between grades by the sensory method was more sensitive. Standardization of scores of each judge reduced error due to tendency of judges to use different portions of continuous scoring lines. Major textural changes in canned salmon were not evident before the transition from grade 3, dark to grade 4, spawning fish. AA

Products

Fish

Surimi

888

Lee (HG), Lee (CM), Chung (KH) and Lavery (SA). **Sodium ascorbate affects surimi gel-forming properties.** *Journal of Food Science* 57(6): 1992: 1343-1347

Effect of sodium-L-ascorbate (SA) on the gel-forming properties of Alaska pollock surimi was studied with respect to optimum level, surimi quality, gel setting, vacuum chopping, freeze-thaw and thermal stabilities, and salt and moisture levels. SA significantly improved gel cohesiveness and sensory firmness of fiberized products with max. strengthening effect at a 0.2% level. Its effectiveness was directly related to surimi quality regardless of vacuum treatment indicating the unimportance of airborne oxygen. Freeze-syneresis promoted by

ascorbate during frozen storage was moderated by the use of hydroxypropylated-modified starch. AA

PROTEIN FOODS

889

Harvey (RA) and Theuer (RC). **Potassium as an index of fruit content in baby food products. Part I. Banana-containing and apricot-containing products.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 929-932

Infant foods

890

Park (YW). **Relative buffering capacity of goat milk, cow milk, soy-based infant formulas, and commercial nonprescription antacid drugs.** *Journal of Dairy Science* 74(10): 1991: 3326-3333

Buffering capacities of goat milk (Alpine, Nubian), cow milk (Holstein, Jersey), soy-based infant formulas, and non-prescription antacid drugs were estimated. Total N, protein, NPN, and P_2O_5 as major buffering entities were quantified for each milk category. Nubian goat milk had the highest levels of the 3 major buffering chemical entities, and the infant formulas contained less total N and NPN compared with natural goat and cow milks. Buffering capacities of the formulas also were lower than those of natural milks. Combinations of milk and antacid drugs had higher buffering capacities than either the milk or drug alone. Drug plus goat milk combinations upon addition of more than 2 ml of acid titrant exhibited fewer changes in pH than the respective drug plus cow milk combinations. AA

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

891

Langstaff (SA), Guinard (J-X) and Lewis (MJ). **Instrumental evaluation of the mouthfeel of beer and correlation with sensory evaluation.** *Journal of the Institute of Brewing* 97(6): 1991: 427-433

Physical and chemical measurements were made on a set of 30 beers which had previously been used to characterize the sensory attributes of the mouthfeel of beer using descriptive analysis techniques: these measurements were then correlated with the sensory attributes. By principal component analysis of the physical and chemical data it was found that the first principal component (PC) was a function of dissolved substances in the beer and the second PC was a function of degree of fermentation. When principal component analysis was performed on the combined sensory and instrumental data, the 30 beers displayed clustering in the PC space based on beer type. AA

892

Ormrod (IHL), Lalor (EF) and Sharpe (FR). **The release of yeast proteolytic enzymes into beer.** *Journal of the Institute of Brewing* 97(6): 1991: 441-443

A simple assay to screen brewing yeast for the release of proteases into beer is outlined and the impact of the yeast proteases on beer foam stability is discussed. AA

Wines

893

Workman (DS) and Morris (JR). **Storage stability of wine coolers as influenced by juice content and citric acid addition.** *Journal of Food Quality* 15(1): 1992: 39-52

Formulations of four flavours of wine coolers, apple, grape, pineapple and citrus, with 10, 50% fruit juice, 0.2 - 0.4% citric acid were stored at 3°C, 21°C for 10 months, at 37°C for 4 months. They showed changes in colour and decreases in pH and carbonation levels. Coolers with 50% juice levels were less stable and scored low for quality. The pineapple coolers with 0.4% citric acid scored significantly higher for flavour. SD

Non-alcoholic beverages

Cider

894

Gomis (DB), Guiterrez (MD), Moran (MJ), Moreno (J), Dapena (E), Cabranes (C), Alonso (JM). **Analytical control of cider production by two technological methods.** *Journal of the Institute of Brewing* 97(6): 1991: 453-456

Two cider-production procedures involving direct fermentation of apple juice and a prefermentative clarification step or defecation wer controlled microbiologically, while chemical monitoring of the major sugars, polyalcohols and organic acids produced during the fermentation was carried out by HPLC. The defecation process markedly slows down alcoholic fermentation and the malolactic conversion. Good correlations between the contents

of D(-) lactate and volatile acidity were obtained for the ciders studied, which indicates that the increased volatile acidity were obtained for the ciders studied, which indicates that the increased volatile acidity of the ciders was basically a result of metabolism mediated by lactic-acid bacteria, the yield being higher in barrels where enzymatic defecation was not applied. Sucrose was rapidly hydrolysed in the first step of the fermentation process, while glucose is the preferential carbon source for the yeasts. Citric acid was produced by the yeasts in the first step of the fermentation process and was later taken up by these microorganisms. Conversion of quinic and shikimic acids seemed to point to a significant activity of heterofermentative lactic-acid bacteria in storage and maturation of ciders. AA

Coffee

895

Lee (TA), Kempthorne (R) and Hardy (JK). **Compositional changes in brewed coffee as a function of brewing time.** *Journal of Food Science* 57(6): 1992: 1417-1419

Variations in the composition of brewed coffee as a function of brewing time were monitored using GC-MS. Batches of coffee were produced using flow rates of 50 - 500 mL/min, which resulted in brewtimes of 4.42 - 31.07 min. While most components increased in concn. with longer brewing times, several showed significant losses beyond 8 min, indicating an optimum brewtime of 7 - 9 min. AA

896

Holscher (W), Vitzthum (OG) and Steinhart (H). **Prenyl alcohol - source for odorants in roasted coffee.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 655-658

The identification and characterization of the sulphur-containing flavour components 3-methyl-2-butene-1-thiol, 3-mercapto-3-methylbutanol, and 3-mercapto-3-methylbutyl formate are described. The volatiles were isolated by simultaneous distillation/extraction. After preseparation by means of column chromatography, preparative HPLC, and GC, the aroma extracts were investigated by capillary GC, GC-MS, and simultaneous GC/sniffing. Identification was carried out by retention and spectroscopic data. The proposed structures were confirmed by synthesis. The results of sensory trials indicate that these components may contribute to the flavour of roasted coffee. As the identified components are very likely to be related to each other by their common precursor prenyl alcohol (3-methyl-2-buten-1-ol), the formation pathway was investigated by means of model reactions. AA

897

Da Porto (C), Nicoli (MC), Severini (C), Sensidoni (A) and Lerici (CR). **Study on physical and physiochemical changes in coffee beans during roasting. Note 2.** *Italian Journal of Food Science* 3(3): 1991: 197-207

During a roasting process carried out in a pilot plant, coffee beans were removed at different times in order to obtian samples with different degrees of roasting from light to very dark. Various physical and chemical changes in these samples were evaluated. Colour, expressed in Commission Internationale d'Eclairage (C.I.E.) parameters (L*a*b*), showed interesting differences between the ground coffee and coffee beans. These changes were shown to decrease in relation to the increase in the degree of roast. Furthermore the content of the main aliphatic acids, which are completely extracted in hot water, were considered. Citric, malic, acetic, lactic and fumaric acids of coffee brew, as well as their contribution to the total acidity, were evaluated in coffee samples with different degrees of roasting. The principal acids were citric and malic, which decrease considerably during roasting. Acetic and fumaric acids had a max. at about 14 - 15% of total wt. loss, while lactic acid increased. The contribution of these acids to the titratable acidity at pH 7.00 was calculated. These results related only to aliphatic acids do not allow the acidity observed in coffee brew obtained from coffee samples of medium and dark roast to be explained. AA

Fruit juices

898

Clydesdale (FM), Grover (R), Philipsen (DH) and Fugardi (C). **The effect of colour on thirst quenching, sweetness, acceptability and flavour intensity in fruit punch flavoured beverages.** *Journal of Food Quality* 15(1): 1992: 19-38

A survey conducted with 75 non-food science major students revealed that sweetest beverages and those coloured brown, red and orange would satisfy the thrust most. In order to test the concept a preliminary study with three sensory panels of 20 subjects was carried out to standardize the appropriate colour space, levels of acid and sugar in a dry fruit punch beverage. Finally 3 large consumer panels of 59 - 121 subjects provided data which indicated that colour was related to quality characteristics other than appearance and should be considered in decisions affecting such characteristics. SD

Orange juices

899

Pieper (G), Borgudd (L), Ackermann (P) and Fellers (P). **Absorption of aroma volatiles of orange juice into laminated carbon packages did not affect sensory quality.** *Journal of Food Science* 57(6): 1992: 1408-1411

Orange juice (OJ) was stored in glass bottles and polyethylene/barrier material laminated cartons at 4°C for 24 wks. Studies carried out on the absorption of 19 OJ aroma compounds (eg., ethyl butyrate, d-limonene) into LDPE showed a reduction of d-limonene of up to 50% by absorption into LDPE inside coating. Absorption of OJ aroma compounds into laminated cardboard packages was strictly dependent on type of aroma compound and its solubility in the absorbing layer. Absorption generally decreased from hydrocarbons, ketones, and aldehydes to alcohols and esters. Ethyl butyrate was not absorbed into LDPE in measureable quantity. Sensory panelists did not distinguish between OJ stored in glass bottles and that stored in laminated cardboard packages with LDPE. BV

900

Lee (HY). **Antioxidative activity of browning reaction products isolated from storage-aged orange juice.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 550-552

The antioxidative activity of methanol extracts of browning reaction products isolated from stored orange juice on the oxidation of linoleic acid was investigated at pH 8.0. The antioxidative activity was assessed by conjugated diene formation from peroxidation of linoleic acid at 40°C. Quantitative changes in linoleic acid were also measured by reversed-phase HPLC. Browning reaction products were found to possess potent antioxidant activity as measured by peroxidation of linoleic acid. The antioxidative activity of browning reaction products was stronger than that of BHA but weaker than that of α-tocopherol at the 0.01% level. The antioxidant effect of browning reaction products appears to increase as juice browning increases. Further fractionation of browning reaction products on a Sep-Pak C_{18} cartridge followed by antioxidative assay revealed that the most effective antioxidant fractions were extracted by 10% and 20% ethyl acetate in hexane and 100% methanol. AA

Tea

901

Owuor (PO) and Orchard (JE). **Effects of storage time in a two-stage withering process on the quality of seedling black tea.** *Food Chemistry* 45(1): 1992: 45-49

Plain black teas withered in 2-stage between 0 - 18 h showed no loss or improvement in quality. Group I volatile flavour compounds (VFC) decreased much higher than the group II VFC with chemical withering time resulting in improvement of flavour index but the changes in the VFC did not change significantly the taste quality. SD

902

Shigematsu (H), Shimoda (M), Yoshitake (K) and Osajima (Y). **Odor-characterization of green tea by multivariate analysis of sensory data.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991: 309-315 (Ja)

In order to elucidate odor-characteristics of green tea, odor-descriptive terms for sensory evaluation of green tea flavour were characterized, and data of sensory evaluation of 60 green tea samples by 5 expert panelists were analyzed by Quantification theory 3 (Quant. 3) and cluster analysis. (1) Images for the terms with unpleasant odor showed small differences among the panelists, but images for the pleasant terms showed accordance among the panelists. (2) On the first and second axes by the Quant. 3, green tea samples were grouped into Gyokuro with their attribute of "Ooika", high grade Sencha very rich in "Chanokaori", "Sinsenka" and "Mirumeka", and middle or lower grade Sencha with defective factors such as "Kowabasyu", "Ichyoka", "Aosyu" and "Ishu". (3) Green tea samples were classified into 8 groups by cluster analysis which was done on the scores from the first to third axis obtained by Quant. 3 including over 80% of total information. AA

FATS AND OILS

903

Nigam (SK) and Misra (G). **Ornamentals - possible source of fat and protein.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 17-18

Fat, fatty acids and protein content of seeds of ornamental flowers like dahlia (Compositae), hollyhack (*Althaea rosea*, Malvaceae), lupin (*Lupinus* Leguminosae), morning glory (*Ipomea purpurea* Convulvulaceae) and Cosmos (Compositae) were analysed. The seeds of cosmos and dahlia yielded substantial amount of fat, 16 - 18% and that of morning glory 10%. The defatted seed meals were rich in protein (20.9 to 47.1%),

dahlia seed fat in oleic acid (72.7%) and lupin and morning glory in saturated acids. GS

Fats

904

Bhattacharyya (S) and Bhattacharyya (DK). **Plastic fats from some saturated acid rich fats by 1,3-specific lipase interesterification and by blending.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 19-20, 22

Plastic fats from saturated acid rich fats from sal, mango and palm was prepared by interesterifying appropriate blends by 1,3-specific lipase and by blending the original fats with the enzymatically interesterified fats. Sal fat, after enzymatic interesterification had its slip melting point raised by 3.5°C and that of mango kernel fat by 2°C. SFI values were lowered at all temp. between 15 to 35°C. A blend of sal fat and palm oil in 1:1 proportion produced a low melting short range plastic fat and a blend of sal fat and mango kernel fat in 2:3 proportion a product like vanaspathi. GS

905

Ulberth (F) and Haider (H-J). **Determination of low level trans unsaturation in fats by Fourier transform infrared spectroscopy.** *Journal of Food Science* 57(6): 1992: 1444-1447

Fourier Transform infrared spectroscopy (FTIR) was an excellent tool for rapid detn. of trans unsaturation in edible fats. Methyl esters were determined as a neat sol., thereby avoiding cumbersome weighing operations and handling of CS_2. The method was calibrated by gravimetrically prepared mixtures of methyl elaidat in methyl esters of a trans fatty acid (TFA) free soy oil. In contrast to TFA concn. > 10%, which could be determined easily by the classic baseline technique, low TFA values were only quantifiable (with high accuracy) after a computer-assisted spectral subtraction procedure. AA

906

Wen (MC) and Kinsella (JE). **Fatty acid composition of suspension cell cultures of *Theobroma cacao* are altered by culture conditions.** *Journal of Food Science* 57(6): 1992: 1452-1453, 1457

Reports the effect of culture conditions on the lipid content and composition of cultured cells of *Th. cacao*. The triglyceride content of cacao suspension cell cultures increased from 0.6 to 2.3% by the addition of coconut water (CW), and by reducing the agitation rate. Culturing of cacao cells in media containing 0.50% casein hydrolysate, palmitic acid content of total lipids decreased from 28% to 17%. Addition of CW, oleic acid showed an increase from 10% to 45% and decrease in linolenic acid by the addition of CW or by omitting sucrose was noticed. GS

Oils

907

Adhikari (S) and Adhikari (J). **Methods for the detection/estimation of admixed vegetable oils.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 39-43

New analytical methods, the first for the detection of palmolein adulteration in groundnut oil using silver nitrate TLC, the second for ambadi oil (*Hibiscus cannabinus*) in other vegetable oils using colour reaction and spectrophotometry and the third for mustard oil in rice bran-mustard blends using spectrophotometry are presented and claimed as sensitive, selective, quick and suitable for routine application. SD

908

Raut (SD), Patil (MN) and Jaiswal (PK). **Detection of water-melon seed oil in groundnut and sesame oils.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 57-58

A simple TLC method detects water-melon seed oil upto 5% in groundnut and sesame oils. It involves extraction of unsaponifiable matter; spotting on silica gel-G coated TLC plates, and development with hexane and ethyl acetate (60:40) mixture; and visualisation of spots with a spraying agent. SD

909

Wamg (Y) and Gordon (MH). **Effect of phospholipids on enzyme-catalyzed transesterification of oils.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 588-590

The effect of phosphatidylcholine (PC), phosphatidylethanolamine (PE) and phosphatidylinositol (PI) on the activity of an immobilized lipase, lipozyme, during transesterification of oils has been studied. PC concn. < 0.05% did not affect the initial rate of transesterification. Higher concn. of PC as well as PE and PI-rich phospholipids at the 0.5% level caused a reduction in the initial reaction rate, but after 10 h transesterification had progressed to the same extent as the control sample. Reuse of lipozyme for 10 batch reactions showed that a PC content of < 0.05% did not cause significant inactivation of the enzyme, but PC contents above

this level caused progressive inactivation of the enzyme and the inactivation increased with PC content. The ability of phospholipids to inactivate the lipozyme was in the order PE > PC > PI. Variation in the acyl groups of PC did not significantly affect inactivation of the enzyme. It is concluded that the phospholipid content of edible oils should be reduced below 200 p.p.m. by degumming if unacceptable inactivation of lipozyme is to be avoided. AA

910

Rittner (H). **Extraction of vegetable oils with ethyl alcohol.** *Oleagineux* 47(1): 1992: 29-42

A detailed study of different aspects of vegetable oil extraction using ethyl alcohol in batch processing units and in installations equipped with conventional extractors can be easily adaptable for use with ethyl alcohol, with few modification and additions to the equipment is presented. Using ethyl alcohol as an extraction solvent can prove particularly worthwhile in countries that produce ethyl alcohol but import hexane, or for small capacity batch processing installations, where it is particularly easy to work at pressures of around 20 to 30 psig, which considerably increase oil solubility in the alcohol, therefore improving extraction yields. BV

Coconut oils

911

Gordon (MH) and Rehman (IA). **Effect of processing on the composition and oxidative stability of coconut oil.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 574-576

Discusses the oxidative stability, composition of coconut oil during the bleaching of oil degummed with phosphoric acid: during alkali refining: during the deodorization of oil degummed with citric acid and bleached: and during the deodorization of oil processed with a combined phosphoric acid degumming and bleaching operation. Residual traces of citric acid or phosphoric acid play an important role in stabilizing processed oils. A combined phosphoric acid degumming and bleaching process leads to smaller losses of tocopherols than sequential treatments. BV

912

Gordon (MH) and Rahman (I). **Effects of minor components on the crystallization of coconut oil.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 577-579

Reports the changes in the crystallization of coconut oil due to refining and the effects of diacylglycerols, free fatty acids and phospholipids on oil crystallization. BV

Groundnut oils

913

Husain (S). **Detection of castor oil adulteration in groundnut oil - a case study.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 49-51

A new ^{13C}NMR spectroscopy method, being rapid and cost effective, is claimed to be capable of giving absolute identity of castor oil in an edible oil sample down to the level of 3%. SD

Olive oils

914

Goncalves (M), Vasconcelos (AMP), Gomes de Azevedo (EJS), Chaves das Neves (HJ) and Nunes da Ponte (M). **On the application of supercritical fluid extraction to the deacidification of olive oils.** *Journal of the American Oil Chemist's Society* 68(7): 1991: 474-480

Palm oils

915

Thomas (PP), Gopalakrishnan (N) and Damodaran (AD). **An integrated dry process for palm oil and kernel oil extraction.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 3-5

An integrated process was developed for palm oil and palm kernel oil production using microwave energy for sterilization, loosening and drying of the fruits. The time taken for the loosening varied from 3 to 5 min exposure depending upon wt. of the spikelets as against the conventional one requiring 20 - 30 min. Moisture content of the fresh fruit including shell and kernel was 30% which when exposed to microwaves reduced to 0.9, after 240 sec. To reduce the quantity of petroleum solvent used in the extraction, part of the oil can be removed by hydraulic pressing. The problem of effluent treatment does not exist in this dry process. Fibre, seed shells and fine particles obtained as byproducts, can be used as fuel. GS

916

Gopalakrishnan (N) and Thomas (PP). **Study of the oil obtained from the oil palm fruit processed with microwave energy.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 45-47

The oil obtained by an integrated dry process from the oil palm fruit using microwave energy was analysed for any chemical changes occurring due to the exposure to microwave energy. It was found that the glycerides or the fatty acids were not affected by microwave energy, whereas a possible chemical degradation of the carotenoids was noticed. The other quality parameters of microwave processed palm oil resembled with those of the conventional palm oil. AA

917
Yoshida (H), Tatsumi (M) and Kajimoto (G). **Relationship between oxidative stability of vitamin E and production of fatty acids in oils during microwave heating.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 566-570

The stability of tocopherols in vegetable oils (palm oil, safflower oil) decreased in the order $\delta > \beta > \gamma > \alpha$ due to microwave heating. The order of decrease depended on the chainlength and lower the degree of unsaturation of fatty acid ethylesters, the greater was the reduction in amount of individual tocopherols. The reduction in tocopherols became greater with increasing levels of free fatty acids. BV

Rapeseed oils

918
Pathak (PK), Agrawal (YC) and Singh (BPN). **Effect of elevated drying temperature on rapeseed oil quality.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 580-583

Reports on the effect of rapeseed drying temp. (range 50 - 250°C) on oil quality. Elevated drying temp. upto 200°C is recommended for rapeseed without adversely affecting oil quality. Based on this study, a saving up to 80% drying time compared to the present practice of drying rapeseed at a max. temp. of 93°C could be effected. BV

Rice bran oils

919
Jayachandra (K) and Azeemoddin (G). **Industrial grade lecithin and powder phosphatides from rice bran oil gums.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 15-16

Lecithin and powder phosphatides were recovered from wet rice bran oil gums (RBOG) from an oil refinery. About 60% of the high water content of RBOG was removed by centrifugation; dried under vacuum at 80°C and designated as lecithin which was unbleached and had pourable consistency. The av. yield of lecithin, on the wt. of the crude gums, was 20%. Dried gums were treated with chilled acetone, stirred well, allowed to settle for 4 h and phosphatides an yellow powder produced. The dried gum contained 3.16% phosphatides. GS

920
Vedanayagam (HS). **A rapid and simple method for the estimation of oil and free fatty acids in rice bran.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 21-22

A rapid and simple method was developed to estimate the oil and free fatty acid contents in rice bran. The oil obtained by percolating hexane through a column of bran placed in a burette was desolventized, weighed and titrated for free fatty acid content. This method requires only half an hour compared to 4 hr by the conventional soxhlet extraction. The results are reproducible and comparable to those obtained by the AOCS methods. AA

921
Thomas (PP), Gopalakrishnan (N) and Damodaran (AD). **Rice bran lipase inactivation by microwaves for low FFA oil.** *Oleagineux* 46(6): 1991: 245-246

Rice bran lipase can be inactivated uniformly for low free fatty acid (FFA) oil by direct exposure to microwaves if the storage period of bran is within 2 wks. If the storage period of bran is about 8 wks, moistening the bran and immediate exposure to microwave for a longer duration is required. Golden yellow coloured oil with 2.0% FFA could be obtained from microwave exposed and stored bran under above conditions. BV

Soybean oils

922
Boki (K), Wada (T) and Ohno (S). **Effects of filtration through activated carbons on peroxide, thiobarbituric acid and carbonyl values of autoxidized soybean oil.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 561-565

The decreases in peroxide value, thiobarbituric acid value and carbonyl value of autoxidized soybean oil and the physical and chemical properties of activated carbons, the results indicate that hydroperoxides, aldehydes and ketones were adsorbed on the acid sites distributed over the surface or within the pores of the activated carbons while the autoxidized soybean oil flowed through the packed column. The results of residual amounts of tocopherols and stability tests suggest that δ-tocopherol at concn. of < 100 µg/g had no effect on oxidative stability of soybean oil and that it was

chemically more stable than α-, β- and γ-tocopherols. BV

923

Lee (H), Chung (BH) and Park (YH). **Concentration of tocopherols from soybean sludge by supercritical carbon dioxide.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 571-573

A supercritical fluid extraction method has been applied to test the feasibility of tocopherol concn. from soybean sludge with CO_2 at temp. and pressures ranging from 35 to 70°C and 200 to 400 bar, respectively. The supercritical solubility of the esterified soybean sludge was over 4 - 6 times > that of the original soybean sludge. By a simple batch-type one-stage method the tocopherols in the esterified soybean sludge could be conc. up to 40 wt%. The overall results of the present study show that soybean sludge initially containing about 13 - 14 wt% tocopherols may require a countercurrent multistage column to be highly and effectively conc. AA

924

Koga (Y), Ike (M) and Iwamoto (H). **Influence of different rancidities of soybean oil on the quality of fried materials.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(3): 1991: 202-210

This study was subjected to compare the qualities of food materials fried by soybean oils with different rancidity. Tofu and egg white gel without any batter were fried with the three types of soybean oils, namely fresh oil ((S-0), foam extension length 27 mm) and two deteriorated oils prepared by heating under air bubbling for 20 and 25 h (S-20 and S-25, foam extension length 32 and 40 mm), respectively. The quality of fried materials was evaluated by quantitative analysis of absorbed oil, measurement with a Texturometer, and histological observation. The results of this exp. indicated that the quality of the fried materials declained steadily from S-0 to S-20 with heating time, and abruptly to S-25 oil by more 5 h heating. Soybean oil was proposed to use for frying food materials as S-0 to S-20 oil (foam extension length 32 mm) in this exp. This seems to be one of the beneficial factors for the quality control of fried food materials in food service industries. AA

Sunflower oils

925

Vasishtha (AK), Bajpai (M) and Singh (C). **Variations in the characteristics and oil compositions in different genetic varieties of sunflower.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 9-14

Analysis of 30 var. of sunflower (*Helianthus annus* L.) seed showed that oil content ranged between 24.1% (var. KSP-9) and 50.4% (var. 1701), protein content from 9.2% (var. 1701) to 28.8% (var. KSP-9, KSP-11). Sunflower oil contained saturated fatty acids (SFA) viz. palmitic, stearic, archidic and lignoceric acid and unsaturated fatty acids (UFA) viz. oleic and linoleic acids. The total SFA in the oils varied between 10.7 and 17.9%; and among the UFA the linoleic acid is predominant. GS

Shortenings

926

Levri (EA), Patrascu (L) and Kelch (WJ). **Peroxide stability in shortening: A useful reference material.** *Journal of Food Protection* 54(11): 1991: 897-899

Vegetable shortening was studied to determine if its peroxide value (PV) was stable enough after storage for 1 yr to be used as a quality control reference material. Shortening samples were deliberately oxidized to contain low, medium, and high levels of peroxide and were then stored at 4°C for 1 yr. PV was measured approx. every 14 days during the yr. A total of 27 different detn. was made at each of the 3 different peroxide levels. The results indicated min. variability within each level of peroxide during the yr, and suggested that shortening would serve well as a reference material for quality control in the fats and oils industry and in food and nutrition research. AA

SPICES AND CONDIMENTS

Spices

Garlic

927

Verghese (J). **Garlic.** *Indian Spices* 29(2): 1992: 4-7, 16

Botanic diagnosis, propogation, dehydrated garlic, allinase and cystein sulfoxides, garlic oil, garlic oleoresin, and encapsulated garlic flavours are the topics covered. SRA

Moringa oleifera

928

D'Souza (J) and Kulkarni (AR). **Comparative studies on nutritive values of tender foliage of seedlings and mature plants of *Moringa oleifera***

(Lamk). *Indian Journal of Nutrition and Dietetics* 27(7): 1990: 205-212

Seedlings foliage of *M. oleifera* (Lamk) is richer in protein (2.8 - 5.8%), lipid (530 - 670 mg/100 g), vitamin A, B_1, B_6 and C content (nearly double), fibre and ash content lesser than that of mature trees. Vitamin B and C being higher than vitamin A, all are comparable to that of green vegetables. GS

Paprika

929

Biacs (PA), Czinkotai (B) and Hoschke (A). **Factors affecting stability of colored substances in paprika powders.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 363-367

A study was undertaken to investigate the change in carotenoid pigment as well as natural effective antioxidant content of paprika during fruit ripening and storage period of the ground products. By means of modern analytical procedure, paprika fruit was found to contain α-tocopherol in the pericarp and γ-tocopherol in the seeds. Ascorbic acid approached max. level when the fruit turned red and then declined. Both antioxidants when added to the ground products have substantially reduced colour impairment occurring during storage. The colour degradation was estimated after 150 days of storage to be 27%, 20% and 15% at ambient storage conditions and 15%, 13% and 5% under refrigeration in untreated, δ-tocopherol-treated, and ascorbic acid-treated powders, respectively. Among different paprika cvs the seeds of F-03 (hot) showed the highest level of tocopherol content, and the powder of such cv showed the lowest degradation of carotenoid pigments during storage. AA

Pepper

930

Sreekumari (KR), Venugopal (G), Paul (SM) and Sivadasan (CR). **Total microbial load, *Salmonella*, *Escherichia coli* moisture content in black pepper.** *Indian Spices* 29(2): 1992: 8-10

In view of the quality evaluation and upgradation Spices Board Lab. surveyed the microbial load and moisture in black pepper at various levels - growers, traders and exporters. Most of the samples from the growers (97.32%) remained within the tolerance limit. Only few samples (2.68%) harboured more than 10^6 cfu/g. None of the trader's samples contained bacteria more than 10^5/g. Most of them (80.85%) were falling in the range of 10^4 and 10^5/g. Moisture and microbial loads were within the limits in all the samples. SRA

931

Shanthi Narasimhan, Rajalakshmi (D) and Nag Chand. **Quality of powdered black pepper (*Pip nigrum* L.) during storage. II. Princip components analyses of GC and sensory profile** *Journal of Food Quality* 15(1): 1992: 67-83

Gas chromatographic fingerprinting of stored blac pepper powder after extraction, volatiles from th Likens-Nickerson extraction and aroma impa fractions were carried out using packed colum routinely used in the spice growing countrie Sensory quality, volatile oil and moisture conte were also analyzed to trace the changes occurrir during storage. The data generated were subjecte to principal components analyses to reduc dimensionality and arrive at impact attributes. Th oxygenated compounds fraction resolved into 25 30 peaks from which a group of 6, including sma yet important peaks, was selected. These peak reflected quality as monitored by sensory respons accounting for 93.4% of information, and are mo meaningful than terpene hydrocarbon peaks of hig resolution. The probable compounds constitutin these principal components are discussed. AA

SENSORY EVALUATION

932

Yau (NJN) and McDaniel (MR). **Carbonatio interactions with sweetness and sourness** *Journal of Food Science* 57(6): 1992: 1412-1416

The effects of CO_2 level on sweetness and c sweetener level on carbonation perception wer measured in two sweetened systems. The effects c CO_2 level on sourness and of acid level o carbonation perception were measured in tw acidulated systems. The effects were measured a concn. in ranges of 2 - 16% (w/v) sucrose, 0.015 0.12% (w/v) aspartame, 0.02 - 0.29% (w/v) citri acid, and 0.015 - 0.06% (v/v) phosphoric acid. Littl effect of carbonation on sweetness was found i either sweetened system. Sucrose at 16% (w/v reduced carbonation perception. Carbonatio enhanced sourness ratings at the lower acid level and had no effect at higher acid levels for either acid No effect of acid level on carbonation perception wa found. AA

933

Conner (MT) and Booth (DA). **Combine measurement of food taste and consume preference in the individual. Reliability precision and stability data.** *Journal of Food Quality* 15(1): 1992: 1-17

The concept that a consumer knows the levels of sensed characteristics in foods was tested by collecting the preferences for the levels of salt in bread and sugar in chocolate, lime drink and tomato soup on a 100 mm line scale with just right category at the centre and rejection categories at the extreme ends. The results confirmed that in the absence of contextual biases, the ratings relative to stable anchor categories of choice behaviour are linear with discriminate differences in the described characteristic. SD

934

Marin (AB), Barnard (J), Darlington (RB) and Acree (TE). **Sensory thresholds: Estimation from dose-response curves.** *Journal of Sensory Studies* 6(4): 1991: 205-225

Thresholds were determined by methods A, B and C by detecting 1,8-cineole added to Concord grape juice presented in a semi-ascending paired design. Method A being a non-zero response test, yielded only an interval estimate whose mid points decreased with increasing sample size. Methods B, being a 2-phase linear model fitted to data and C a logistic model to show max. curvature, gave comparable threshold values which did not decrease with increasing sample size. SD

935

Shepherd (R), Farleigh (CA) and Wharf (SG). **Effect of quantity consumed on measures of liking for salt concentrations in soup.** *Journal of Sensory Studies* 6(4): 1991: 227-238

The effect of ingestion on the relative-to-ideal ratings of salt in tomato soup was studied in the 2 experiments in which 30 panelists rated the samples firstly at the first sip and again at the end of consuming 200 g of each sample as 'just right', 'not nearly salty enough' and 'much too salty'. In the first experiment samples with varying salt content were given together in random order while in the second experiment the samples one by one. The results showed that the use of small samples related reasonably well to the final rating as the realistic measure of liking and also resulted in a higher ideal concn. of salt in the food. SD

936

Gatchalian (MM), De Leon (SY) and Yano (T). **Control chart technique: A feasible approach to measurement of panelist performance in product profile development.** *Journal of Sensory Studies* 6(4): 1991: 239-254

Quantitative descriptive scores provided by trained panelists for young coconut were analysed by control chart (CC) method and analysis of variance (ANOVA) method. Both methods reflected the product quality in the same manner but the vol. of data to be handled in ANOVA is more and CC easier and interesting to apply for testing the panel performance, individual consistency and agreement between them. SD

FOOD STORAGE

937

Krishnamurthy (TS), Narasimhan (KS) and Muralidharan (N). **A quick method for monitoring carbon dioxide in controlled atmosphere storage of foodgrains.** *Research and Industry, India* 37(3): 1992: 184-186

CO_2 levels in controlled atm. storage of foodgrains were estimated by a quick and efficient volumetric method using an alkali solution. The kit with hypodermic syringes is easy to adopt, accurate and also cost-effective compared to other methods using infrared gas analyser, indicator tube, interferometer and chemoassay. GS

INFESTATION CONTROL AND PESTICIDES

938

Rajasri (M), Reddy (GPV), Krishnamurthy (MM) and Deva Prasad (V). **Bioefficacy of certain newer insecticides including neem products against chilli pest complex.** *Indian Cocoa, Arecanut* 15(2): 1991: 42-44

Efficiency of foliar sprays, 6 synthetic organic insecticides, 4 neem preparations and 1 chitin inhibitor were evaluated for control of pests of chilli (*Capsicum annum* L.). Results indicated that triazophos and phosalone (0.1%) sprays were effective against sucking pests, thrips, aphids (upto 90% mortality) and mites (> 75% mortality), amitraz (0.1%) against mites (78% mortality), triazophos (0.1%), trabon (0.01%) and fenvadevate (0.01%) against pod borers (*Heliothis armigera* and *Spodoptera litura*) and chitin inhibitor, duphar (0.1% spray) least effective. Synthetic insecticides were better than neem prepartions. GS

939

Uma Mageshwari (S) and Tamilarasi (P). **Dietary sodium intake in normal and selected diabetics, hypertensives and hypertensives with diabetes.** *Indian Journal of Nutrition and Dietetics* 27(7): 1990: 200-204

The pattern of dietary intake of Na in healthy persons, hypertensives, diabetics and patients with both diabetes mellitus and hypertension were studied. The hypertensives and diabetics consumed more salt (higher than the required amount) than the rest. Consumption of Na was less with vegetarians than non-vegetarians (animal food contains more of Na). Patients with both diatetes and hypertension consumed less Na than others. Nutrition education and dietary counselling to patients are essential to maintain health conditions. GS

940

Prasad (RBN), Manjula (K), Krishnamurthy (A) and Lakshminarayana (G). **Preparation and surfactant properties of N-acyl condensates of neem seed protein isolate and hydrolysate.** *Journal of the Oil Technologists Association of India* 24(2): 1992; 55-56

N-acyl condensates were prepared by reacting neem protein isolate and the hydrolysate separately with lauric, palmitic and stearic acids. All the products were evaluated as their Na salts for surface tension, emulsification, wetting and foaming properties. Condensates of the isolate were better than the hydrolysate condensates in emulsification power and of the hydrolysate better than the isolate condensates in wetting ability. N-lauroyl condensates showed better surfactant properties than the palmitoyl and stearoyl condensates. N-lauroyl condensates of the hydrolysate was better than Na lauryl sulphate in reducing surface tension and increasing wetting. AA

941

Mauri (LM), Alzamora (SM) and Tomio (JM). **Effect of electrolytes on the kinetics of thiamine loss in model systems of high water activity.** *Food Chemistry* 45(1): 1992: 19-23

The study on the influence of electrolytes NaCl, KCl and Na_2SO_4 in model systems of reduced a_w = 0.95 at pH 4.0 and 5.5 and processing temp. 80, 90 and 100°C confirmed a first order reaction kinetics for thiamine degradation. The a_w alone is not useful for predicting thiamine stability and so the effect of the solute 'per se' must be considered for further study. SD

942

Hamada (JS). **Peptidoglutaminase deamidation of proteins and protein hydrolystates for improved food use.** *Journal of the American Oil Chemist's Society* 68(7): 1991: 459-462

The limited deamidating ability of peptidoglutaminase (PGase) toward intact food proteins (0 - 6% deamidation) can be significantly enhanced by prior protein hydrolysis and altering protein conformation by such means as moist heat. PGase deamidation increases protein solubility and improves emulsifying and other physical properties under mildly acidic conditions. A batch reactor method was developed for the large-scale PGase deamidation of food proteins. Michaelis-Menten kinetics for industrial reactions (mixed zero- and first-order) were used for predicting the behaviour of the reactor and for calculating enzyme dosage required to completely deamidate a given quantity of protein. Using such a reactor in the deamidation of food proteins or protein hydrolysates can lead to new food proteins with superior functional properties from less functional starting materials. AA

943

Song (J) and Wander (RC). **Effect of dietary selenium and fish oil (MaxEPA) on arachidonic acid metabolism and hemostatic function in rats.** *Journal of Nutrition* 121(3): 1991: 284-292

Male Sprague-Dawley rats were fed for 8 wk semipurified diets containing 7% corn oil or 5.5% fish oil plus 1.5% corn oil with or without selenium supplementation. The diets caused no difference in wt. gain, food intake or plasma malondialdehyde content. The data obtained suggest that the effect of dietary selenium on hemostatic function and the production of eicosanoids is minor. SD

944

Nishina (PM), Schneeman (BO) and Freeland (RA). **Effects of dietary fibers on non fasting plasma lipoprotein and apolipoprotein levels in rats.** *Journal of Nutrition* 121(4): 1991: 431-437

Fibre-free (control) diet and 4 other diets viz cellulose, protein, wheat bran and oat bran containing 8% dietary fiber by wt. fed to rats with initial wt. 115 - 130 g for 4 wks showed that the dietary fibers are able to alter non-fasting lipoprotein cholesterol and apolipoproteins and that pectin, a soluble fiber, was most effective in lowering plasma cholesterol levels. SD

945

Clifford (AJ), Heid (MK), Peerson (JM) and Bills (ND). **Bioavailability of food folates and evaluation of food matrix effects with a rat bioassay.** *Journal of Nutrition* 121(4): 1991; 445-453

Folate bioavailability of beef liver, lima beans, peas, spinach, mushrooms, collards, orange juice and wheat germ was estimated with a protocol of folate depletion-repletion using growth and liver, serum and erythrocyte folate of weanling male rats. Diets with 125, 250 and 375 µg folic acid/kg were standards. Individual foods were incorporated into a folate-free amino acid based diet alone (250 µg folate/kg diet from food) or mixed with folic acid (125 µg folate from food + 125 µg folic acid) to evaluate folate bioavailability and effects of food matrix. Beef liver and orange juice folates were as available as folic acid, whereas those of wheat germ were less bioavailable. Folates of peas and spinach were also less available than folic acid using liver and serum folate concn. and total liver folate as response criteria, but they were not lower when based on growth and erythrocyte folate concn. Lima bean, mushroom and collard folates were as available as folic acid using 4 or 5 response criteria. Folate bioavailability of all foods generally exceeded 70%. All response criteria gave approx. equivalent results, indicating that growth and tissue folate levels are appropriate criteria. No food matrix effects were observed for any food except lima beans. Foods rich in polyglutamyl folates were less bioavailable than those of foods rich in short-chain folates. AA

946

El-Saadany (SS), El-Massry (RA), Labib (SM) and Sitohy (MZ). **The biochemical role and hypocholesterolaemic potential of the legume *Cassia fistula* in hypercholesterolaemic rats.** *Die Nahrung* 35(8): 1991: 807-815

947

Froseth (BR) and Mckay (LL). **Development and application of pFM011 as a possible food-grade cloning vector.** *Journal of Dairy Science* 74(5): 1991: 1445-1453

An origin of replication and a nisin resistance determinant on a 7.6-kb EcoRI fragment, capable of existing as an independent replicon when circularized, was used to construct a vector for cloning homologous DNA in *Lactococcus lactis* ssp. *lactis*. A medium, designated M17-GTN, was developed to identify *L. lactis* ssp. *lactis* cells containing pFM011 from a mixed population of nisin-sensitive cells and was then used to select nisin-resistant transformants produced by electroporation or by protoplast transformation. To demonstrate the usefulness of nisin resistance as a selectable marker, a 6.3-kb EcoRI fragment encoding reduced bacteriophage sensitivity was cloned into the EcoRI site of pFM011. Separately, the erythromycin resistance marker from pGB301 was cloned into the HindIII site of pFM011. Both plasmids were introduced into *L. lactis*, ssp. *lactis*. The origin of replication of pFM011 was localized to a 2.2-kb HindIII-HaeIII fragment. Seven additional unique restriction sites on pFM011 for cloning purposes were added by inserting a multiple cloning site. Results indicated that pFM011 and its recombinant derivatives were relatively stable in the *L. lactis* ssp. *lactis* background. As pFM011 was derived entirely form lactococcal DNA, this study demonstrates its use as a food-grade cloning vector for lactococci. AA

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

948

Goodburn (K). **Food irradiation - legislation and consumer acceptability.** *Food Science and Technology Today* 4(2): 1990; 83-87

Briefly covers detection methods, consumer acceptance, consumer resistance, EC directive and UK legislation. BV

949

Cockbill (C). **Food law by the year 2000.** *Food Science and Technology Today* 4(2): 1990; 109-111

Covers briefly trends in food law, training, labelling rules and food law in the European community. BV

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